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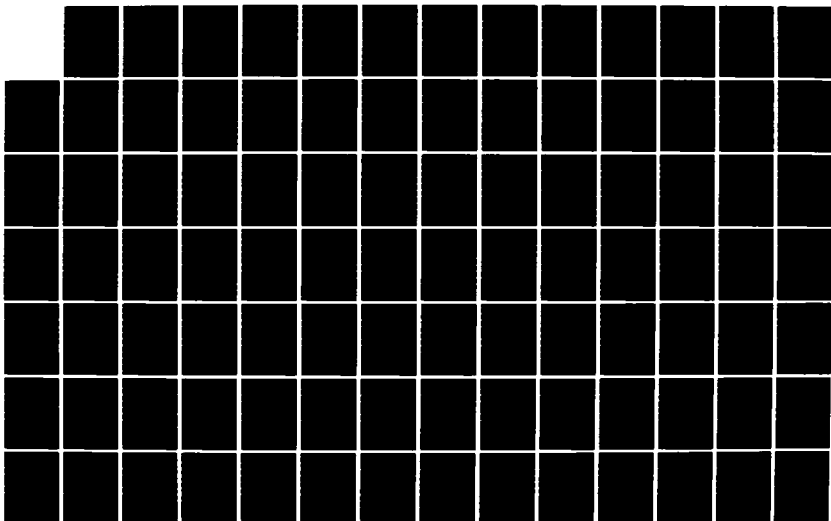
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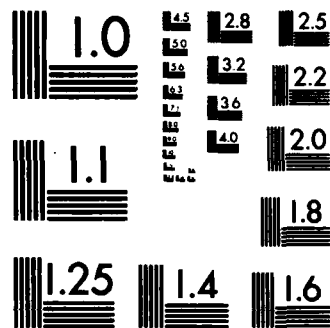
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**TERRESTRIAL AND AQUATIC BIOLOGICAL INVENTORY
MEREDOSIA LAKE AND WILLOW CREEK
DRAINAGE AND LEVEE DISTRICT
CASS AND MORGAN COUNTIES, ILLINOIS
FINAL REPORT**

Submitted to:

**ST. LOUIS DISTRICT
CORPS OF ENGINEERS
210 TUCKER BLVD., NORTH
ST. LOUIS, MO 63101**

Submitted by:

**U.S. FISH AND WILDLIFE SERVICE
ROCK ISLAND FIELD OFFICE
ROCK ISLAND, ILLINOIS 61201**

OCTOBER 1982

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Aquatic resources in the study area have been severely impacted by drainage and channelization. The inventory of aquatic resources was based on 16 reconnaissance sites and six sampling stations. Water quality parameters, plankton, benthic macroinvertebrates and fish populations were sampled using standard collecting methods. Phytoplankton populations were generally low, except for a borrow/ditch area. The most common zooplankton taxa included diatoms, Cladocera, copepods and chironomids. Oligochaetes and chironomids dominated the benthic populations. The most often collected fish species were carp, shiners and centrarchids. It is unlikely that any endangered species are present in the study area.

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GENERAL INTRODUCTION

The St. Louis District, U.S. Corps of Engineers, is currently evaluating the feasibility of improving existing flood control for the Meredosia Lake and Willow Creek Drainage and Levee District. The biological inventory that follows will be utilized during the project's planning and assessment stages in determining current conditions and any impacts the project may have on the environment.

The objectives of this study are to: 1) identify the terrestrial and aquatic habitat types present on the area and, using photo-interpretation, determine the amounts of each type, 2) review and include any applicable literature on Meredosia Lake and Willow Creek Drainage and Levee District, 3) determine the fish, wildlife, and vegetation components of each habitat type, and 4) discuss and quantitatively and qualitatively evaluate each habitat type.

The Meredosia Lake and Willow Creek Drainage and Levee District is located in southern Cass and northern Morgan counties east of Meredosia Lake and the Illinois River, between Willow Creek (river mile 72.2) and Indian Creek (river mile 79.0). The District was originally organized as Willow Creek Drainage and Levee District in 1893 and Meredosia Lake Drainage and Levee District in 1904 (Mulvihill and Cornish, 1929). It currently consists of 7,510 acres of land and is bordered by approximately 7.9 miles of flank levees, adjacent to Willow and Indian Creeks, and 8.0 miles of riverfront levees.

TERRESTRIAL SECTION

MATERIALS AND METHODS

Study Area

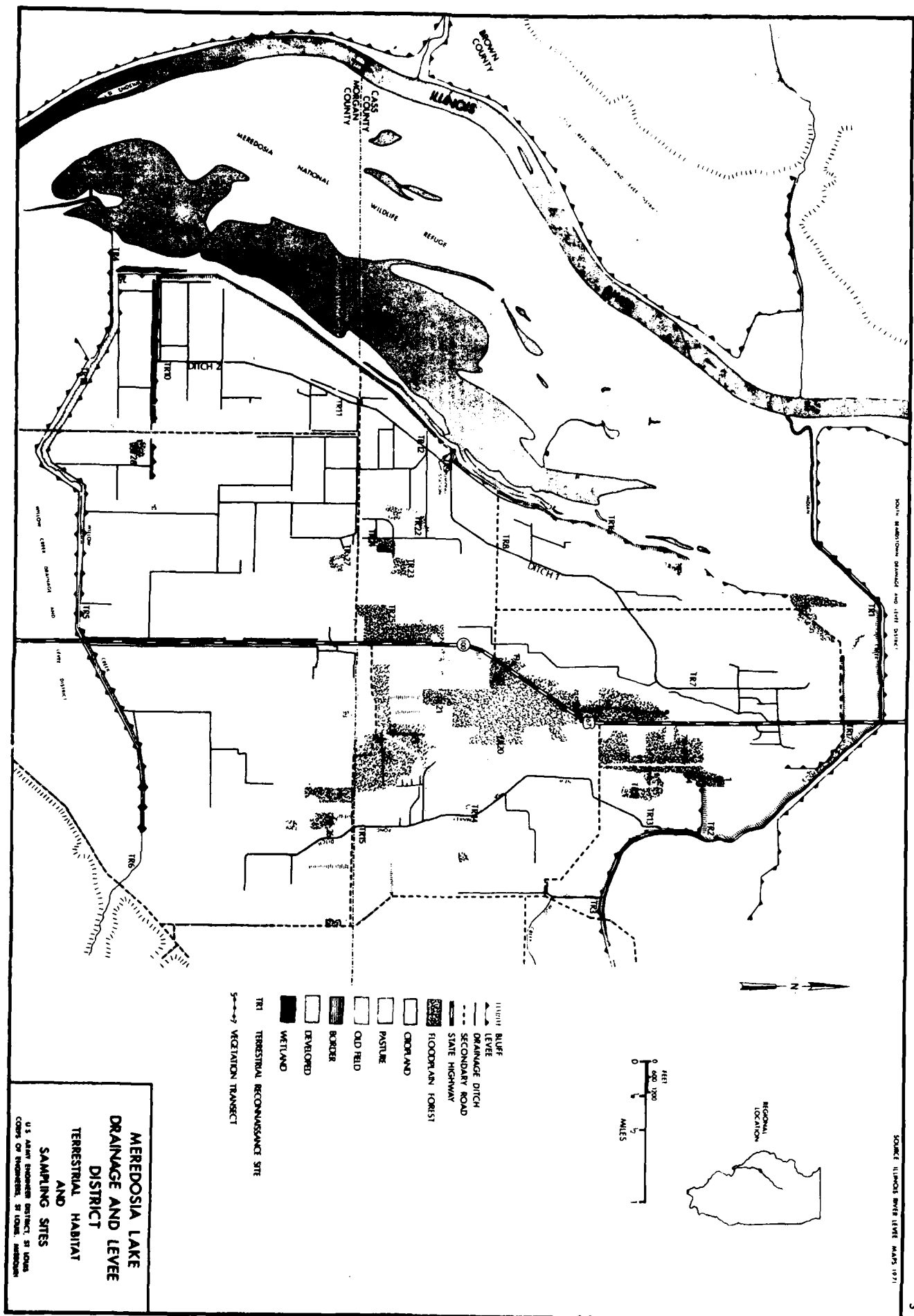
Meredosia Lake and Willow Creek Drainage and Levee District consists of 7,510 acres of land within the floodplain of the Illinois River. The predominate habitat type is currently cropland with lesser amounts of floodplain forest and border habitats. Developed areas are limited to farmsteads or small residential groupings. No towns or villages exist within the District's boundaries.

Methods

Field reconnaissance sites to qualitatively examine terrestrial habitats within the study area were completed. A total of 28 sites were observed (Figure 1). These sites were located at the upper, middle and lower reach of the District's two adjacent streams and three major ditches, riverward of the two flanking and the riverward levees, and at ten forested sites throughout the District. Information collected includes habitat type: dominant plant and crown closure or percent cover for the overstory, understory and ground cover; wildlife observed; availability of food plants; and any special characteristics that would influence the quality of wildlife habitat such as den sites and successional trends.

Biological sampling took place at three floodplain forest tracts located within the District (Figure 1). These areas were sampled by transecting the tracts and observing plants at sites 300 feet apart. A total of 25 sites were observed. At each site, three concentric circles were established using a stake and measured chain. Flagging tape was used to mark the limits of each circle. The plots were 0.2 acre (52.7 foot radius) for overstory, 0.05 acre (26.3 foot radius) for understory and 0.01 acre (11.8 foot radius) for ground cover. Overstory was defined as trees greater than or equal to 12 feet in height or 10 inches in diameter at breast height (DBH). Understory consisted of trees and shrubs less than 12 feet in height or 10 inches DBH. All plants were observed in each of the circles. Ranges in DBH, number of individuals for each taxa and crown closure were noted for the overstory, the number of individuals for each taxa noted for the understory and percent cover for each plant taxon collected for all subplots. Crown closure was obtained using a spherical densiometer, Lemon (1956) and Lemon (1957). Plants were identified to the generic level and unknowns were collected, pressed and identified using Britton and Brown (1913), Jones (1971), Mohlenbrock (1973), and Peterson and McKenny (1968). Terrestrial vertebrates and any special characteristics were noted during sampling.

A set of 1979 color aerial photographs (scale 1:24,000) and a base map (scale 1:14,400) were supplied by the St. Louis District for the study area. Habitat types were determined as follows and identified on the aerial photos:



- 1) Floodplain forest - areas that are dominated by trees and are located within the historical floodplain of the Illinois River. Both forest communities adapted to and not adapted to hydric conditions are included in this classification. This classification also includes a small pine plantation in the study area.
- 2) Cropland - areas utilized for the growth of agricultural crops that are planted and harvested annually, excluding pasture and hayland.
- 3) Pasture and hayland - areas dominated by perennial grasses or forbs, native or introduced, that are mowed at least once per year or periodically plowed and planted primarily for livestock grazing.
- 4) Old field - former cropland and otherwise disturbed areas which have been allowed to revert back to natural vegetation.
- 5) Border - narrow strips of idle land occurring along streams, ditches, fence rows, levees, ephemeral drainages, roads, and railroad beds. The type varies from site to site, dependent upon the successional age of the community and the condition with which it was associated.
- 6) Developed land - this habitat includes urban areas, roads, homesteads, and other areas affected by non-agricultural disturbance.
- 7) Riverine - this type is comprised of all live drainages including streams and ditches.
- 8) Lakes - permanently flooded, shallow water bodies that will be included in the habitat mapping.
- 9) Wetland - an area where hydric soils and hydrophytes, other than trees, predominate. This includes seasonally and perennially flooded lowlands, normally too moist for agricultural use. This general definition was used to facilitate aerial interpretation and mapping for this report. A more detailed definition, that may be utilized for impact analysis, can be found in Cowardin et al. 1979.

The habitats were traced onto a mylar sheet and the area of each individual habitat determined by using a compensating polar planimeter. As a result of their linear nature, the length of ditches and roads were measured and multiplied by an average width of 15 feet and 40 feet respectively, to obtain area. The individual habitats identified were transferred to the base map and sampling sites added (Figure 1).

RESULTS AND DISCUSSIONS

Habitat Types

The habitats delineated for Meredosia Lake and Willow Creek Drainage and Levee District and the amount of each habitat type are given in Table 1. As with all the Drainage and Levee Districts adjacent to the Illinois River, the current habitats differ markedly from the pre-project condition. A set of maps depicting channel conditions and habitats adjacent to the Illinois River around 1900 was prepared by W.J. Woermann (1904) for the

TABLE 1. Areas of Terrestrial and Aquatic Habitats Located Within
Meredosia Lake and Willow Creek Drainage and Levee District.¹

Habitat	Area in Acres	Percent of Total
Floodplain Forest	952.3	12.7
Cropland	5800.3	77.2
Pasture and Hayland	94.6	1.3
Old Field	11.9	0.2
Border	334.6	4.5
Developed	207.2	2.7
Riverine	106.3	1.4
Lake	0	0
Wetland	2.8	<0.1
TOTAL	7510	100

- 1 - The study area outside the District includes the region between the riverfront levee and the Illinois River. This region is predominantly composed of Meredosia National Wildlife Refuge, which totals 1,850 acres, and the 1,484 acre Lake Meredosia. A 63.4 acre area, between Lake Meredosia and the southwest portion of the riverfront levee, is in private ownership. This area is composed of a 13.8 acre borrow/ditch aquatic site and a 49.6 acre developed tract.

Corps of Engineers. At that time, bottomland forests, small lakes, wetland areas and, presumably, the associated fauna were in greater abundance. However, it should be noted that these habitats were interspersed with croplands, especially as the distance from the Illinois River increased. A more detailed description and discussion of current habitats follows. A listing of plants and animals observed in the District is given in Tables 2 through 7.

Floodplain Forest

The floodplain forest habitats, which comprise 12.7 percent of the area within Meredosia Lake and Willow Creek Drainage and Levee District, are strongly influenced by the type of soils on which they exist. Generally, most of the forested areas within the District are dominated by several species of oak trees with an abundance of ground cover. These areas are found on sandy soils that are well drained and probably not cultivated because these soils limit the productivity of agricultural crops (Figure 1). There are some wood lots (TR24 and TR27) within the District that have moister soils and are dominated by more typical bottomland species (Havera et al. 1980) such as silver maple, willow and cottonwood. These trees are also prevalent along watercourses within and outside the District.

Our biological sampling identified 14 genera of trees present in the overstory of the three large tracts of forest sampled (Table 2). Oaks occurred at the most sites followed by hickories, basswood and sassafras. Basswood, although present at over half the sites, was never very abundant. The crown closure varied from 32 to 92 percent and averaged about 75 percent.

The understory contained 17 genera, with dogwoods occurring at the most sites followed by elms, sassafras, oaks and hickories (Table 3). All of these types occurred at over half the sites, however, elms were never in abundance. The percent cover varied dramatically ranging from 5 to 90 percent and averaged 50 percent.

The ground cover present in the biological sampling areas included 42 genera of which Virginia creeper was the only taxon present at all 25 sites (Table 4). Other common genera included horseweed, raspberry, wild grape, greenbrier and gooseberry. The percent cover ranged from 50 to 100 percent and averaged 78 percent. It was noted during the reconnaissance survey that ground cover was reduced in the moist woodlots dominated by silver maple.

Most of the woodlots appeared to have been previously disturbed by selective cutting or, in some cases, by grazing. However, there were only two forested areas where grazing was currently or recently occurring. Many of the oak trees were of substantial size, as evidenced by the fairly extensive crown closure. These larger oak trees were responsible for the presence of adequate supplies of hard mast, which are used by wildlife as food. In floodplain forest areas where moister soil conditions prevailed and oaks were not prevalent, mast supplies were significantly reduced. Although ground cover was extensive, the existence of small oaks and hickories in the understory indicate that progression toward an oak-hickory

TABLE 2. Estimated Percent Cover of Overstory Genera in Twenty-five Floodplain Forest Sample Plots.

Genera	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Silver Maple			2																						
Boxelder			1																						
Wild Cherry																				23					
Paw Paw			49																						
Hop Hornbeam	8								1	1															
Persimmon								1																	
Black Locust		25	30	69				3	32	21															
Oak	35	22			70	50	29	70	42	60	55	65	50	45	44	70	63	65	37	50				29	
Walnut			2	8																					
Hickory					1			1	5	2	1	5	30	35	15		1	1	36	10				1	
Sassafras	35	20		2			2	8		2	7			5							5				
Basswood	2	3	2	2	4	2		1	1	1		1	1	2			1			2			10		
Elm	1	1							1		1		1							2			2		1
Hackberry	1	20	5	2						3														5	
Dead	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	3	2	1			1	
Crown Closure (%)	83	92	92	84	76	53	32	85	83	91	65	71	83	86	62	72	65	70	76	89	86	80	72	83	36

TABLE 3. Estimated Percent Cover of Understory Genera in Twenty-five Floodplain Forest Sample Plots.

Genera	Plots																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Wild Cherry																									
Sumac					7	5					5		3		10	2	28	35			17	2	3	4	
Paw Paw		30	48					10																	
Honey Locust								30																	
Sweet Viburnum									22																
Strawberry Bush						1																			
Dogwood	2				8	5		25	35	10	40		60	55	5	3		64	79	4	7	5	18	49	
Black Locust									1	2										1					
Oak					7	20	1				1	3	9	3	1	3	1	8		1			2		
Walnut		1		2																					
Hickory					3	14	3	3			6	2	10	10	9	2	5	7	1						
Sassafras	75	22			7	2		20	3	24	7		10	35						15	6	2			
Cedar											1		1												
Swamp Privet																				1					
Basswood				3	1			1				1	2												
Elm	3	2	1		7	3	1	1	1	2							1		1				3	1	
Hackberry		15	1	75																					
Total Cover (%)	80	70	50	80	40	50	5	90	40	60	60	5	85	80	60	10	35	50	65	80	40	15	20	25	50

Table 4 Continued.

Genera	Plots																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Cinquefoil															12	13	6	8							
Avens				2																					
Raspberry					14	2	14	5		1	14	5	9		10	2	30	22			17	49	30	14	41
Multiflora Rose			3			19		5																	
Mullen												1													
Greenbrier					5	9	14	16	4	2	8		3	2	4	7			13					2	1
Stinging Nettle				2																					
Wood Nettle																									
Violet	7	1			1	1			1	1					1										
Wild Grape	5				4	2					5	2	5	1	6	9	2	4			35	5	20		3
Virginia Creeper	17	15	12	6	19	25	10	17	19	25	19	6	19	27	27	18	35	45	12	25	41	20	53		41
Unknown						1		2		1	1	2		6		3	4	4	6	9					1

Total	65	60	80	65	80	85	95	60	80	80	60	80	50	80	85	75	60	80	90	75	60	100	100	90	100	100
Ground Cover (%)																										

climax may be occurring if the forested areas are left intact and relatively undisturbed.

Dead trees are used by birds and mammals for nesting and denning sites. The dead wood is conducive for the formation of cavities created by woodpeckers and natural decomposition. These openings are used by a number of cavity nesting birds and as denning sites for squirrels and raccoons. Dead trees were present at most reconnaissance and sampling sites. Their presence will enhance the value of the floodplain forest habitat for wildlife within the study area.

The birds observed during field work on the District are given in Table 5. Many species will use the floodplain forest during migration and some breeding species probably occur on the study area in addition to those observed. A listing of bird species that could occur in the Illinois River Valley, and would generally be applicable for the study area is given in Havera et al. (1980) and Terpening et al. (1975). The most common species observed in the floodplain forest were red-bellied woodpecker, red-headed woodpecker, blue jay, wood pewee, yellow-billed cuckoo, rose-breasted grosbeak, and black-capped chickadee. In addition, many edge species such as the indigo bunting, cardinal, American goldfinch and northern oriole were observed utilizing this habitat.

A list of the mammals observed in the study area is given in Table 6. A more complete list of mammals occurring in the Illinois River Valley may be found in Havera et al. (1980) or Terpening et al. (1975). The most common species, or their sign, observed included white-tailed deer, raccoon, fox squirrel and cottontail rabbit.

No reptiles or amphibians were observed in this habitat during field surveys, although some species undoubtedly exist. A listing of potential species can be found in Havera et al. (1980) and Terpening et al. (1975).

Cropland

Approximately 77.2 percent of the Meredosia Lake and Willow Creek Drainage and Levee District is currently in cultivation (Table 1). As is true throughout most of the state, the most common crops include corn, soybeans and winter wheat.

Cropland is generally utilized only as a temporary food source by most species of wildlife. The predominance of fall plowing curtails the use of croplands for winter cover or as a food source for most of the year.

The most common wildlife species observed in this habitat are birds, including red-winged blackbirds, horned larks, and killdeer. Other species using border habitats are found in the general area. White-tailed deer sign was noted in this habitat but nearly always adjacent to border or floodplain forest habitats. During the spring when precipitation levels are increased and some flooding may occur within the district, croplands are utilized by migrating and to a lesser extent breeding waterfowl and shorebirds. Waterfowl use may also occur in the fall when large numbers of birds use Meredosia National Wildlife Refuge as a resting and staging area. This is especially the case where fall plowing does not occur and waste grain is more available as a food source.

TABLE 5. Birds Observed in the Meredosia Lake and Willow Creek Drainage and Levee District During May, June, July 1982.

Common Name	Scientific Name
Great Blue Heron	<u>Ardea herodias</u>
Green Heron	<u>Butorides striatus</u>
American Bittern	<u>Botaurus lentiginosus</u>
Mallard	<u>Anas platyrhynchos</u>
Wood Duck	<u>Aix sponsa</u>
Turkey Vulture	<u>Cathartes aura</u>
Bobwhite	<u>Colinus virginianus</u>
Ring-necked Pheasant	<u>Phasianus colchicus</u>
Killdeer	<u>Charadrius vociferus</u>
Ring-billed Gull	<u>Larus delawarensis</u>
Mourning Dove	<u>Zenaida macroura</u>
Rock Dove	<u>Columba livia</u>
Yellow-billed Cuckoo	<u>Coccyzus americanus</u>
Great Horned Owl	<u>Bubo virginianus</u>
Chimney Swift	<u>Chaetura pelagica</u>
Belted Kingfisher	<u>Megasceryle alcyon</u>
Common Flicker	<u>Colaptes auratus</u>
Red-bellied Woodpecker	<u>Melanerpes carolinus</u>
Red-headed Woodpecker	<u>Melanerpes erythrocephalus</u>
Hairy Woodpecker	<u>Picoides villosus</u>
Downy Woodpecker	<u>Picoides pubescens</u>
Eastern Kingbird	<u>Tyrannus tyrannus</u>
Great Crested Flycatcher	<u>Myiarchus crinitus</u>
Eastern Wood Pewee	<u>Contopus virens</u>
Horned Lark	<u>Eremophila alpestris</u>
Rough-winged Swallow	<u>Stelgidopteryx ruficollis</u>
Barn Swallow	<u>Hirundo rustica</u>
Blue Jay	<u>Cyanocitta cristata</u>
Common Crow	<u>Corvus brachyrhynchos</u>
Black-capped Chickadee	<u>Parus atricapillus</u>
House Wren	<u>Troglodytes aedon</u>
Mockingbird	<u>Mimus polyglottos</u>
Catbird	<u>Dumetella carolinensis</u>
Brown Thrasher	<u>Toxostoma rufum</u>
Robin	<u>Turdus migratorius</u>
Wood Thrush	<u>Hylocichla mustelina</u>
Eastern Bluebird	<u>Sialia sialis</u>
Blue-gray Gnatcatcher	<u>Polioptila caerulea</u>
Cedar Waxwing	<u>Bombycilla cedrorum</u>
Starling	<u>Sturnus vulgaris</u>
Yellowthroat	<u>Geothlypis trichas</u>
House Sparrow	<u>Passer domesticus</u>
Eastern Meadowlark	<u>Sturnella magna</u>
Red-winged Blackbird	<u>Agelaius phoeniceus</u>
Northern Oriole	<u>Icterus galbula</u>
Common Grackle	<u>Quiscalus quiscula</u>
Brown-headed Cowbird	<u>Molothrus ater</u>
Summer Tanager	<u>Piranga rubra</u>
Cardinal	<u>Cardinalis cardinalis</u>
Rose-breasted Grosbeak	<u>Pheucticus ludovicianus</u>
Indigo Bunting	<u>Passerina cyanea</u>
American Goldfinch	<u>Carduelis tristis</u>
Dickcissel	<u>Spiza americana</u>
Rufous-sided Towhee	<u>Pipilo erythrophthalmus</u>
Song Sparrow	<u>Melospiza melodia</u>

TABLE 6. Mammals or Their Sign Observed in the Meredosia Lake and Willow Creek Drainage and Levee District During May, June, July 1982.

<u>Common Name</u>	<u>Scientific Name</u>
Opossum	<u>Didelphis marsupialis</u>
Eastern Mole	<u>Scalopus aquaticus</u>
Fox	<u>Vulpes vulpes</u>
Raccoon	<u>Procyon lotor</u>
Fox Squirrel	<u>Sciurus niger</u>
Plains Pocket Gopher	<u>Geomys bursarius</u>
Beaver	<u>Castor canadensis</u>
Muskrat	<u>Ondatra zibethicus</u>
Eastern Cottontail	<u>Sylvilagus floridanus</u>
White-tailed Deer	<u>Odocoileus virginianus</u>

Pasture and Hayland

This habitat type comprised only 1.3 percent of the total study area (Table 1) and was limited to the levee area along Willow Creek. This area was heavily grazed with a few willows being the only tree or shrub species present. The higher ground near the levee is dominated by grasses. Other floral species such as smartweeds, sedges and tealgrass occur in moist soils close to Willow Creek.

Bird species observed in this area include red-winged blackbirds, grackles, killdeer, house sparrows, and barn swallows. The only mammal observed was the sign of pocket gophers. No amphibians and reptiles were noted.

Old Field

This habitat was limited to only 0.2 percent of the study area (Table 1). However, it was observed that many areas immediately landward of the levee were not cultivated this year. There were signs that most of these areas were plowed last year and the aerial photos indicate that these areas were farmed in 1979. Apparently during high water years, such as this spring and early summer, hydrologic pressure from outside the levee increases the wetness of these areas thereby not allowing the soil to be tilled and crops planted.

The plants present in the old field habitats are dominated by sedges, dock and to a lesser degree duck potato, pickerelweed and cattails. Wildlife species observed using this habitat type include red-winged blackbird, mallard, tree swallow, muskrat, eastern garter snake and crayfish. A list of amphibians and reptiles observed in District is given in Table 7.

Border

This variable habitat type is found throughout the study area adjacent to existing steams and ditches as well as in narrow strips of hedgerows and adjoining levees. Many vegetational types are found in this habitat and border constitutes 4.5 percent of the study area (Table 1). Although relatively small in total area, this habitat type is used extensively by many wildlife species and enhances the value of croplands by providing winter, resting and nesting habitat.

Vegetation varies from areas where grasses and vetch are the dominant species to brushy areas comprised of raspberries, mulberries and dogwoods to narrow strips of mature trees with such species as oak, black locust and sassafras dominating with an abundance of ground cover. A variety of birds which frequent other areas also use this habitat. Those frequently observed include the red-winged blackbird, cardinal, northern oriole, brown thrasher, indigo bunting, kingbird, bobwhite, goldfinch, yellow-shafted flicker, and yellowthroat. Mammals commonly observed include white-tailed deer, fox squirrel, cottontail, opossum, red fox, raccoon, eastern mole and in the more sandy areas the pocket gopher. The American toad, bullfrog, eastern garter snake and red-eared turtle were also observed.

The border habitat along Indian Creek gradually changes from typical bottomland timber composed of silver maple, cottonwood and willow in the lower reach to mainly ground cover with some understory in the upper reach.

TABLE 7. Amphibians and Reptiles Observed in the Meredosia Lake and Willow Creek Drainage and Levee District During May, June, July 1982.

<u>Common Name</u>	<u>Scientific Name</u>
American Toad	<u>Bufo americanus</u>
Spring Peeper	<u>Hyla crucifer</u>
Leopard Frog	<u>Rana pipiens</u>
Bullfrog	<u>Rana catesbeiana</u>
Red-eared Turtle	<u>Pseudemys scripta</u>
Northern Water Snake	<u>Nerodia sipedon</u>
Eastern Garter Snake	<u>Thamnophis sirtalis</u>

Shading of the stream varies from 60 percent in the lower reaches to 10 percent in the upper reaches. Clearing appears to be the reason for this dicotomy and if the habitat was allowed to succeed, bottomland timber would dominate the banks throughout the study area. Typical bird species expected in this habitat such as red-winged blackbirds, grackles, and yellowthroat were observed. The lower reaches had extensive mammal use by muskrat, beaver, raccoon, fox and white-tailed deer.

Willow Creek has been extensively modified by man's activities. The extreme lower end has bottomland timber adjacent to it, but for the majority of the distance within the District, the banks and adjoining levee are heavily grazed. Commonly observed wildlife include red-winged blackbirds, barn and bank swallows, killdeer and grackles.

The border habitat along ditch #1 is currently severely disturbed with virtually no trees, some understory, and ground cover is composed primarily of Equisetum, foxtail, smartweed and wild grape. The lower reaches provide the best wildlife habitat with the red-winged blackbird, mourning dove, American goldfinch, grackle and robin being the most common bird species observed. Although currently disturbed, this ditch provides the only non-agricultural habitat present in much of the interior, northwest region of the District. For this reason, deer use this habitat as a corridor, as evidenced by numerous tracks and observation of a lone individual. The lower reach contained numerous turtles of an undetermined species. Roscoe Hardwick, a District Commissioner, stated that this ditch was formerly lined with trees, but was cleared about five years ago. He said that previously, excellent populations of bobwhite occurred along the ditch but were mostly gone now.

The habitat bordering most of ditch #2 is very similar to that found along ditch #1. However, the uppermost portion of the ditch, in the vicinity of sites AR10 and TR10 (Figures 1 and 5) contained a wetland area that gradually changed to understory-dominated, border habitat. The wetland area adjacent to the ditch contained cattails, pickerelweed, sedges and smartweed (AR10). The plants gradually changed to terrestrial species which extensively covered the banks (TR10) and were dominated by sassafras, mulberry, dogwood, and black locust with grasses, grape, and lamb's quarters present as ground cover. Red-winged blackbird, yellowthroat, song sparrow, grackle and killdeer were the most common bird species observed. In addition, an American bittern, a state endangered species, was observed in the ditch. Deer tracks and crayfish sign were commonly observed. The lower portion of ditch #2 was in the process of succeeding to its natural climax community. Young ash, birch and silver maple were pioneering and becoming overstory. About half the cover was in understory composed of sumac, sassafras, mulberry, ash and dogwood. Ground cover was extensive and equally distributed between forbs and grasses. In addition to the usually sighted wildlife species, a green heron was observed and raccoon sign was noted.

Pankey Pond ditch in general, provided the best border habitat present in the District. Areas of middle maturity floodplain forest flank the ditch and are interspersed with areas dominated by a diverse understory throughout most of its length. Commonly observed bird species include the red-winged blackbird, mourning dove, brown thrasher, northern oriole,

grackle, indigo bunting, and a group of cedar waxwing. Mammal sign was relatively abundant and included deer, opossum, eastern mole, fox, beaver, rabbit and raccoon.

The lower portion of the old channel of Mud Creek (aquatic sampling station 3) contained a relatively wide grass waterway on either side of the creek with no trees or shrubs. The only wildlife noted in addition to the commonly observed species, was a northern water snake, adult bullfrog and large numbers of tadpoles. During seining operations in a 100 foot portion of the ditch, 88 tadpoles were collected. A local farmer stated that in other areas within the District there were also extensive numbers of tadpoles present.

Developed Land

Two and seven-tenths percent of the study area (Table 1) is comprised of scattered developments. Generally, this habitat type is disturbed by man's activities and only plants and animals adapted to survival with man predominate. Birds common to these areas would include the house sparrow, starling, rock dove (pigeon), barn swallow, chimney swift and if feeders are present, other edge and forest species. Mammals generally include the house mouse, white-footed mouse, and Norway rat. Garter snakes may be present if the habitat is suitable.

Wetland

The only wetland, as defined in this report, observed within Meredosia Lake and Willow Creek Drainage and Levee District is located immediately east of a woodlot and is labeled aquatic reconnaissance site 16 (Figure 5). The wetland is 2.8 acres in size (Table 1) and has formed adjacent to an existing ditch.

The dominant plant is river bulrush with lesser amounts of sedges, pickerelweed, cattails and smartweed. A pair of nesting mallards was noted in this wetland. Other wildlife observed include red-winged blackbirds and numerous sign of crayfish. The small size of this wetland will preclude its use by large numbers of wildlife but other species commonly found in this habitat type may be expected to occur.

Riverine and Lake

These habitat types will be discussed in the aquatic section of this report.

Hunting and Trapping

No specific written accounts concerning hunting and trapping were found for Meredosia Lake and Willow Creek Drainage and Levee District. Hunting and trapping activities are probably similar to those found in the Hartwell District (ESE, 1982a), although the larger forest area present in this study area may present additional opportunities for the more upland species. Harvest figures for several species on a statewide basis can be found in Preno and Labisky (1971). Regional harvest data, developed from hunter mail surveys, is given in Hubert (1977).

Game species known to occur on site include mallard, wood duck, bobwhite, ring-necked pheasant, cottontail, fox squirrel and white-tailed deer. Species more commonly trapped that occur on the area include muskrat, beaver, raccoon, opossum and fox. Mink and weasel are also probably present although not observed.

Roscoe Hardwick, a District Commissioner, stated that bobwhites are obtained from the State and raised and released within the study area. He said that excellent bobwhite hunting occurred along ditch #1 before it was cleared. Other local farmers stated that hunting for squirrels and deer occurs on the District. Waterfowl hunting has greatly diminished over the years, this is partially related to loss of habitat and fall plowing which reduces the available food. Wild turkeys are not yet found in the District, although they are present in Pike County. Local sportsmen stated they expect that wild turkeys may colonize the area.

Natural Areas, Nature Preserves and Refuges

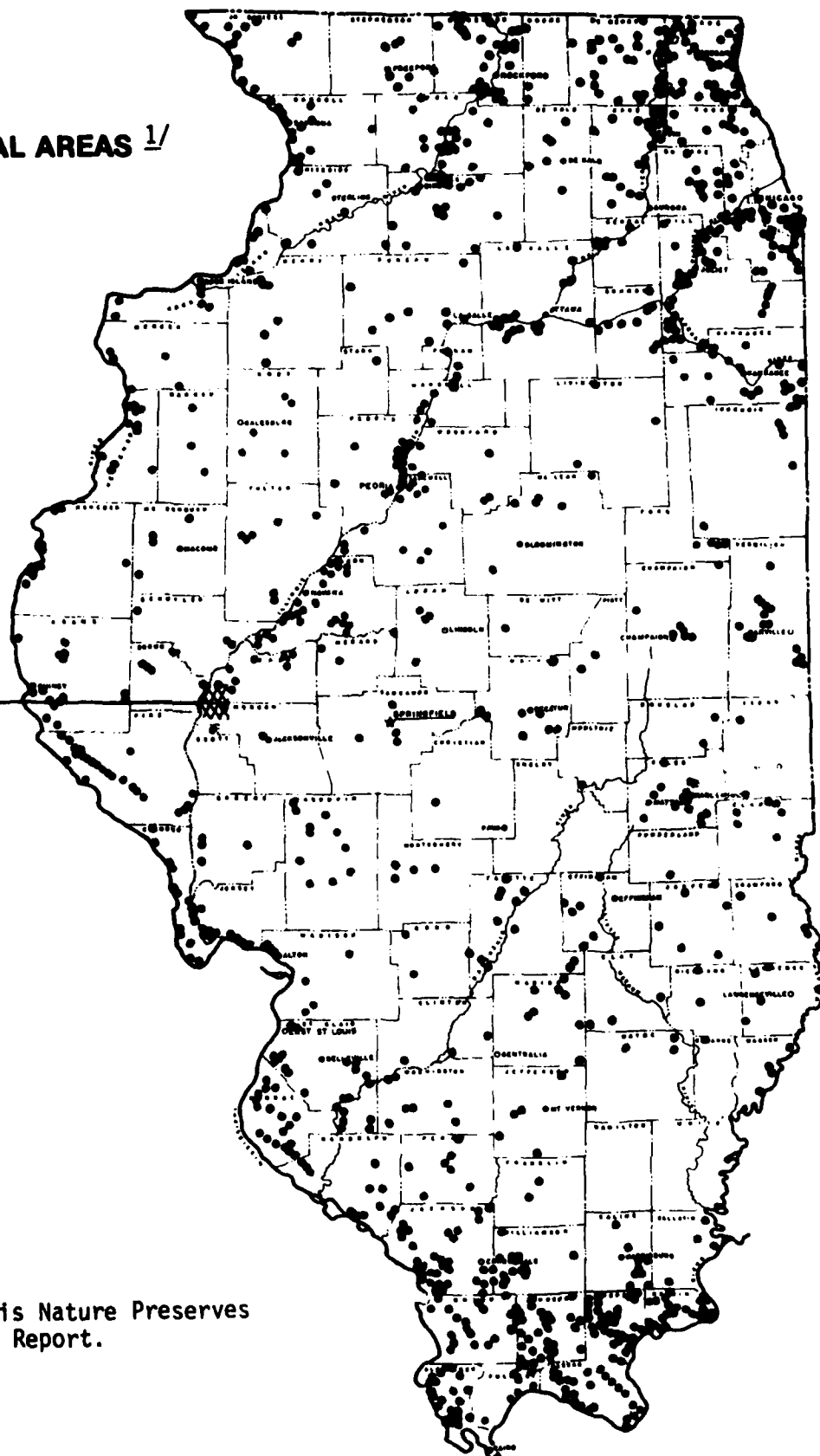
Currently, no natural areas or nature preserves are located within the Meredosia Lake and Willow Creek Drainage and Levee District (Figures 2 and 3). The closest natural area is located east of the Illinois River bluff landward of the District in northern Morgan County. In addition, several natural areas are located north of the study area in Brown and Cass Counties. The nearest nature preserve (a sand prairie area) is located north of the study area in Mason County.

No state parks, conservation areas or refuges are present in the immediate vicinity of the study area. However, Meredosia National Wildlife Refuge (NWR) is located between the Illinois River and Lake Meredosia, immediately west of the District (Figure 4). The 1,850 acre refuge was established by a gift from the Illinois Chapter of the Nature Conservancy in 1973. The Refuge is composed of bottomland forest, dominated by silver maple (Havera et al. 1980) and interspersed with wetland areas. Wildlife present on the refuge include the federally endangered bald eagle and 13 state endangered bird species. Waterfowl use on the refuge is mainly migrating species, however, over 500 young wood ducks and an undetermined number of mallards were produced on the Refuge in 1980. An annual average of 1,814,995 waterfowl use days occurred on Meredosia NWR between 1974 and 1980. Twenty-one species of ducks and geese are documented for the refuge. Common marsh birds found on the Refuge include the coot, great blue heron, great egret, sora rail, double-crested cormorant and American bittern. A total of 28 species of shorebirds were recorded on Meredosia NWR and use was over 88,000 days. Common raptors observed include the barred owl, screech owl, great-horned owl and red-tailed hawk. Mourning doves are common on the Refuge and normally have about 20,000 days of use. Bobwhite quail and pheasant are the only resident game birds. Resident mammal populations include white-tailed deer, muskrat, woodchuck, raccoon, striped skunk, red fox, cottontail, opossum, mink, southern flying squirrel and fox squirrel. A total of 13 amphibians, 29 reptiles, and 14 fish have been reported on the refuge. The above data was supplied by Tom Sanford, Refuge Manager, Chautauqua NWR, Havana, Illinois.

Figure 2.

LOCATIONS OF NATURAL AREAS ^{1/}

Location of
Study Area



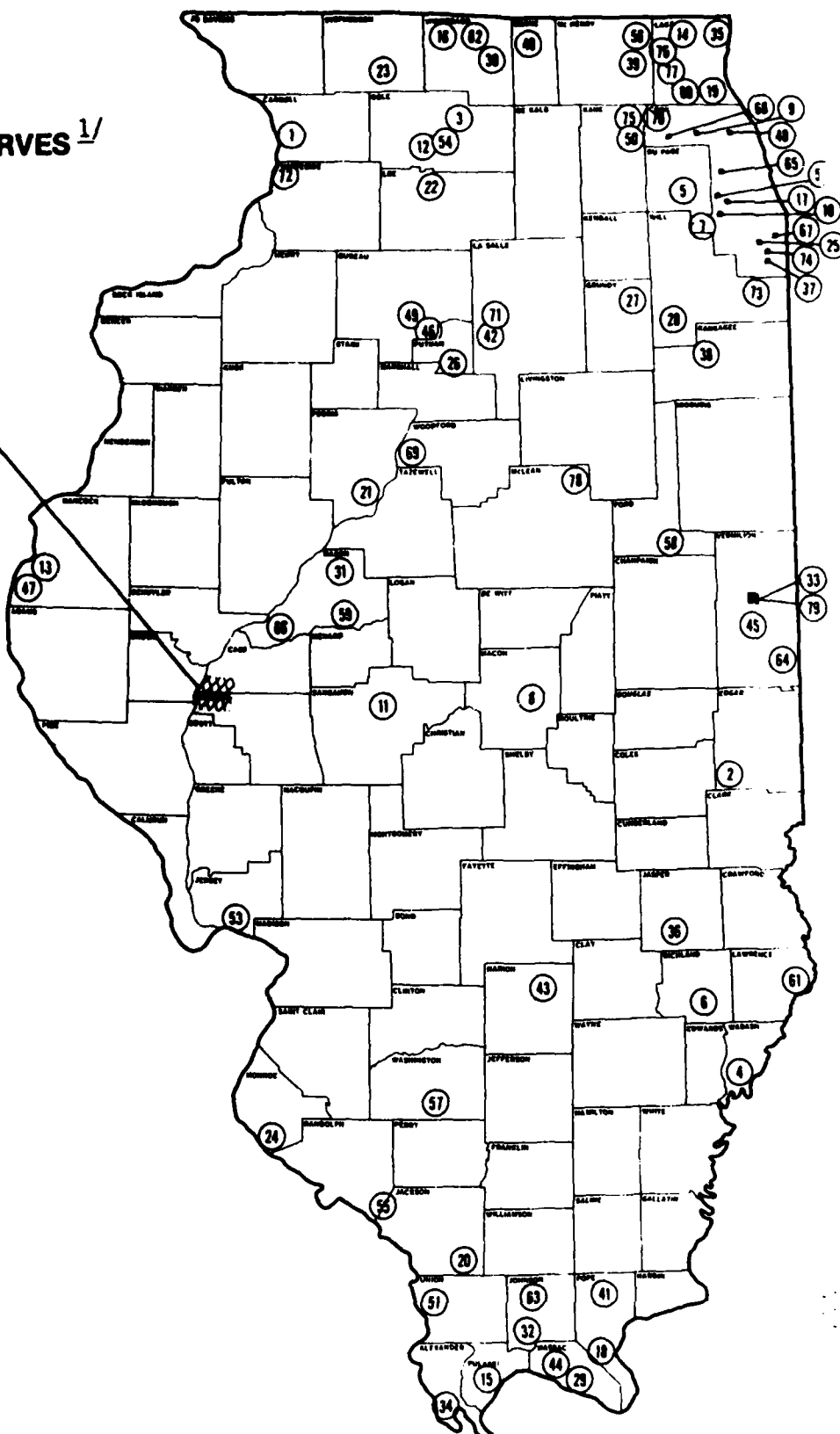
^{1/} Taken from Illinois Nature Preserves System, 1979-1980 Report.

Figure 3.

ILLINOIS NATURE PRESERVES ^{1/}

Location of Study Area

NATURE PRESERVE	COUNTY	ACRES
1. Agave Sand Prairie	Carroll	100.0
2. Baber Woods	Idg	90.0
3. Beach Country Prairie	Ogle	1.5
4. Beall Woods	Wabash	320.0
5. Belmont Prairie	DePue	10.4
6. Big Creek Natural Woods	Shelby	40.0
7. Black Portridge Woods	Cook	80.0
8. Bois du Sangham	Madison	30.0
9. Boone Forest	Cook	140.0
10. Cap Source Holdings	Cook	1,130.0
11. Carpenter Park	Stamper	222.0
12. Castle Rock	Ogle	500.0
13. Cedar Glen	Madison	165.0
14. Cedar Lake Bog	Lake	37.5
15. Chautauk Hills	Polk	212.0
16. Chautauk Sand Bluff	Polk	44.0
17. Cherry Slough	Cook	172.0
18. Crookston Hills	Polk	166.0
19. Edward L. Brown	Lake	270.0
20. Fox Woods	Polk	170.0
21. Foxwood Park	Polk	90.0
22. Franklin Grove	Lee	96.0
23. Fremont Prairie	Stephenson	1.5
24. Gale Hill Prairie	Madison	400.0
25. Gaudin-McIntosh Prairie	Cook	95.0
26. George S. Park	Madison	80.0
27. Grove Lake Prairie	Madison	1,551.5
28. Grove Woods	Will	70.0
29. Haines	Madison	14.7
30. Haines	Madison	15.0
31. Haines	Madison	130.0
32. Henry Allen Glens	Madison	1,001.0
33. Henry Ford-Little Black Slough	Madison	51.0
34. Horseshoe Bottom	Madison	491.0
35. Horseshoe Lake	Madison	820.0
36. Illinois Woods	Madison	407.0
37. Jackson County Prairie	Madison	120.0
38. Johnson Woods	Madison and Will	170.0
39. Johnson Woods	Madison	242.0
40. Johnson Woods	Madison	37.0
41. Johnson Woods	Madison	110.0
42. Johnson Woods	Madison	160.0
43. Johnson Woods	Madison	45.0
44. Johnson Woods	Madison	60.2
45. Johnson Woods	Madison	250.0
46. Johnson Woods	Madison	45.0
47. Johnson Woods	Madison	1.3
48. Johnson Woods	Madison	20.0
49. Johnson Woods	Madison	43.0
50. Johnson Woods	Madison	212.0
51. Johnson Woods	Madison	105.0
52. Johnson Woods	Madison	297.4
53. Johnson Woods	Madison	90.0
54. Johnson Woods	Madison	111.0
55. Johnson Woods	Madison	80.0
56. Johnson Woods	Madison	40.0
57. Johnson Woods	Madison	5.0
58. Johnson Woods	Madison	53.0
59. Johnson Woods	Madison	12.0
60. Johnson Woods	Madison	120.0
61. Johnson Woods	Madison	47.0
62. Johnson Woods	Madison	53.0
63. Johnson Woods	Madison	100.0
64. Johnson Woods	Madison	245.0
65. Johnson Woods	Madison	1,460.0
66. Johnson Woods	Madison	70.0
67. Johnson Woods	Madison	9.0
68. Johnson Woods	Madison	10.0
69. Johnson Woods	Madison	500.0
70. Johnson Woods	Madison	503.0
71. Johnson Woods	Madison	17.0
72. Johnson Woods	Madison	50.0
73. Johnson Woods	Madison	440.0
74. Johnson Woods	Madison	20.0
75. Johnson Woods	Madison	161.0
76. Johnson Woods	Madison	17.0
77. Johnson Woods	Madison	5.0
78. Johnson Woods	Madison	33.0
79. Johnson Woods	Madison	10,771.2



1/ Taken from Illinois Nature Preserves System, 1979-1980 Report.

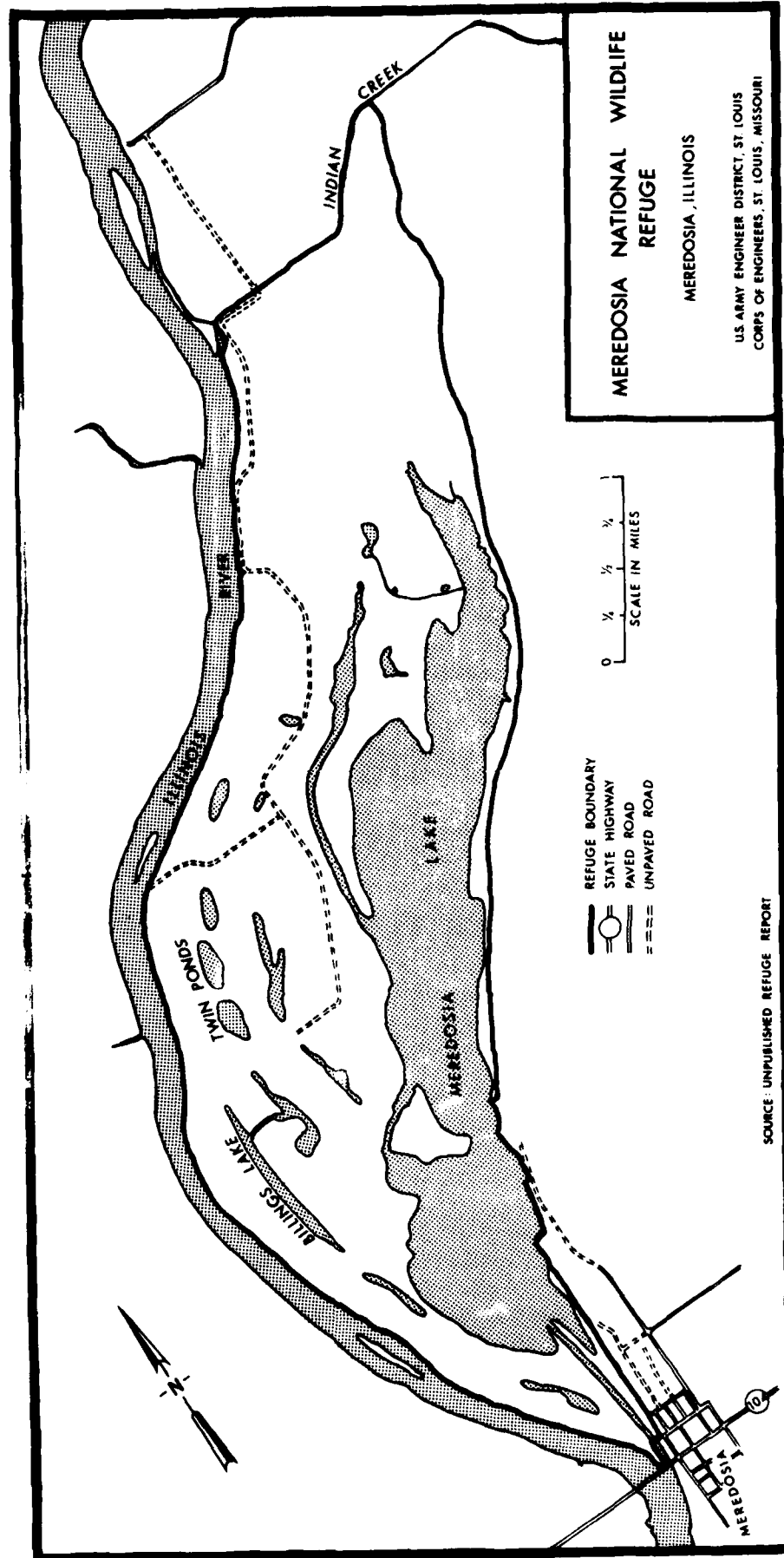


FIGURE 4

Threatened and Endangered Species

A list of threatened and endangered wildlife species that could potentially occur in Meredosia Lake and Willow Creek Drainage and Levee District is given in Table 8. The Illinois Department of Conservation lists five species as occurring in Cass and Morgan counties. Meredosia NWR has documented over 9,000 use days by an additional 13 species of state endangered birds. During field work for this report, an American bittern was observed within the District. In addition, lactating Indiana bats were collected at Pike County Conservation Area which is less than 20 miles from the project area, therefore, it is possible that they could occur within the District.

The Strecker's chorus frog, yellow and Illinois mud turtles and western hognose snake all occur in sandy areas, either in river lowlands or sand prairies. This type of undisturbed habitat formerly occurred within the District, however, as a result of intensive cultivation most, if not all, of these areas are currently much altered. The bird species documented on Meredosia NWR could use the District for feeding or resting, however, breeding sites would be limited within the District because of the disturbed nature of the habitat. This would generally be true for the other bird species listed, although their presence would be less likely because they have not been documented at the Refuge. The bobcat may travel through the District but because of the large habitat requirements and disturbed nature of most of the habitat, it is unlikely that permanent residence would be established. Gray bats extensively utilize caves during most of the year. The absence of caves within the District would indicate that their presence is unlikely. Indiana bats utilize riparian forest for breeding and foraging. The presence of this habitat within the District, coupled with the documented lactating female collected less than 20 miles south of the study area, indicates that this species could occur on the study area.

The threatened and endangered plants that occur in Cass and Morgan counties are given in Table 9. These species are rare because of disturbance of their natural habitats. The nature of land use in the District will reduce the likelihood of their presence and none of these species has been collected in the study area.

SUMMARY

The Meredosia Lake and Willow Creek Drainage and Levee District has influenced the Illinois River floodplain for over 80 years. The diverse ecological community composed of floodplain forest, bottomland lakes and sloughs, wetlands and sand prairies interspersed with croplands that once existed has been altered to maximize agricultural production. Over 75 percent of the 7,510 acres within the District is currently cropland and this area is checkered with ditches that drain virtually all the wetlands that were formerly present. Currently, the most noteworthy areas benefiting wildlife in the study area are the 950 acres of oak dominated floodplain forest and 335 acres of linear, border habitat found adjacent to existing water courses and hedgerows.

TABLE 8. Threatened and Endangered Wildlife That May Occur on the Meredosia Lake and Willow Creek Drainage and Levee District Study Area.

Common Name	Scientific Name	Classification ^{1/}	
		A	B
<u>Reptiles and Amphibians:</u>			
Strecker's Chorus Frog ²	<u>Pseudacris strekeri</u>		X
Yellow Mud Turtle ²	<u>Kinosternon flavescens</u>	X	
Illinois Mud Turtle ³	<u>K.f. spooneri</u>	X	
Western Hognose Snake ²	<u>Heterodon nasicus</u>		X
<u>Birds:</u>			
Double-Crested Cormorant ⁴	<u>Phalacrocorax auritus</u>	X	
Great Egret ⁴	<u>Casmerodius alba</u>	X	
American Bittern ⁴	<u>Botaurus lentiginosus</u>	X	
Black-Crowned Night Heron ⁴	<u>Nycticorax nycticorax</u>	X	
Cooper's Hawk ⁴	<u>Accipiter cooperii</u>	X	
Red-Shouldered Hawk ⁴	<u>Buteo lineatus</u>	X	
Bald Eagle ⁴	<u>Haliaeetus leucocephalus</u>	X	
Osprey ⁴	<u>Pandion haliaetus</u>	X	
Marsh Hawk ⁴	<u>Circus cyaneus</u>	X	
Wilson's Phalarope ⁴	<u>Steganopus tricolor</u>	X	
Black Tern ⁴	<u>Chidonias niger</u>	X	
Common Tern ⁴	<u>Sterna hirundo</u>	X	
Short-eared Owl ⁴	<u>Asio flammeus</u>	X	
Yellow-headed Blackbird ²	<u>Xanthocephalus xanthocephalus</u>	X	
<u>Mammals:</u>			
Indiana Bat ²	<u>Myotis sodalis</u>	X	

^{1/} A - State Endangered; B - State Threatened.

^{2/} Listed for Cass and Morgan Counties in IDOC publication: Endangered and Threatened Species of Illinois.

^{3/} Present in county, p.c. Michael Sweet, Endangered Species Biologist-IDOC

^{4/} Recorded on Meredosia National Wildlife Refuge.

TABLE 9. State Threatened and Endangered Plants Recorded for Cass and Morgan Counties.^{1/}

Common Name	Scientific Name	Classification Threatened-Endangered	
CASS COUNTY			
False Tarragon	<u>Artemisia dracunculus</u>	X	
Small Burhead	<u>Echinodorus tenellus</u>		X
Queen of the Prairie	<u>Filipendula rubra</u>	X	
Vahl's fimbristylis	<u>Fimbristylis vahlII</u>		X
Wood Orchid	<u>Habenaria clavellata</u>		X
Tubercled Orchid	<u>Habenaria flava</u> var. <u>herbiola</u>	X	
Mottled Lipocarpa	<u>Lipocarpa maculata</u>		X
Ginseng	<u>Panax quinquefolius</u>	X	
Hairy Bead Grass	<u>Paspalum bushii</u>		X
Pink Milkwort	<u>Polygala incarnata</u>		X
Yellow Cress	<u>Rorippa truncata</u>		X
American Burnet	<u>Sanguisorba canadensis</u>		X
Bulrush	<u>Scirpus hallii</u>		X
Bulrush	<u>Scirpus smithii</u>		X
Netted Nut Rush	<u>Scleria reticularis</u>		X
Patterson Bindweed	<u>Stylisma pickeringii</u>	X	
MORGAN COUNTY			
False Tarragon	<u>Artemisia dracunculus</u>	X	
Ginseng	<u>Panax quinquefolius</u>	X	
Pink Milkwort	<u>Polygala incarnata</u>		X
Prairie Spiderwort	<u>Tradescantia bracteata</u>		X

^{1/} From Endangered and Threatened Species of Illinois, The Natural Land Institute, 1981.

A wide variety of plants and wildlife utilize the study area for breeding and during migration. Most of the species observed are, in general, commonly found within this portion of the Illinois River Valley. An exception is the American bittern, a state endangered species, that was observed in the study area. In addition, further investigations should be made to determine the status of the Indiana bat, a state and federal endangered species, within the District. Several other state endangered birds have been documented on Meredosia National Wildlife Refuge, located immediately west of the District, and could be present on the study area at different times of the year.

AQUATIC SECTION

MATERIALS AND METHODS

Study Area

The Meredosia Lake Drainage and Levee District is bordered on its north side by Indian Creek and on its south side by Willow Creek. Both of these creeks have been channelized to facilitate drainage. The District contains approximately 44 miles of interior ditches. Three main ditches drain the interior (Figure 5). The ditches on the western portion of the District drain to a central pumphouse where water is released through a gravity drain or pumped outside the District over the existing riverward levee. The ditches on the east side of the District drain through Pankey Pond ditch to Indian Creek.

Methods

Field reconnaissance sites were established to qualitatively examine aquatic habitats within the District. A total of 16 sites were examined and sampled (Figure 5). These sites were located at the upper, middle and lower reaches of the two streams and three main ditches in the study area. In addition, one site was added, a small river bulrush marsh, because it was the only habitat of its type within the District. Information collected includes approximate low flow width, average and range of depths, water color, water clarity, instream cover, bottom type, pool-riffle ratio, length of pools, sinuosity, fishing intensity, and bank cover including dominant species, percent cover and percent shading.

Biological sampling took place at six locations within the study area (Figure 5). These six stations were sampled for plankton, benthos and fish. Zooplankton samples were collected using 30 liters of water passed through a plankton net equipped with a No. 25 stainless steel mesh. Samples were fixed and identified in the lab by a subcontractor (Dr. Joseph Beatty, Department of Zoology, Southern Illinois University). Phytoplankton samples were collected by obtaining a four liter water sample, fixing the sample, allowing it to settle, and having the subcontractor identify the organisms present in the precipitate (Lipsey, 1980).

The benthos were collected using a 6x6 inch ponar dredge at the six stations sampled. A ponar dredge was used at all sites because of the soft substrates. The Indian Creek site had a bottom substrate composed of sand, all other sites were silt bottoms. Five samples were obtained at each site. No riffles were present at the sites, therefore, a transect was run across each site. The samples were rinsed through a 30 mesh screen, preserved and identified in the lab.

Fish samples were obtained at all six sampling stations. At stations 2 through 5, 1/4-inch mesh block seines were placed at the upper and lower ends of the sampling stations and the lead line staked. A 25-foot 1/4-inch mesh bag seine was then used to seine the sampling area. Repeated seine hauls were made until diminishing returns made further effort futile. A 12-volt backpack shocker was then used to sample the edges of the sampling



FIGURE 5

site and any areas where instream structures inhibited seining. At station number 1, block seines could not be used because the current was too strong even with stakes placed at intervals along the bottom, the nets could not be held in place, thus forcing the abandonment of this technique. Instead five 50-foot seine hauls were made using a 25-foot, 1/4-inch mesh bag seine and a 12-volt backpack shocker was used along stream margins and around instream cover. At station number 6, the water depth precluded the use of block seines, therefore, one hour of electrofishing and three 50-foot seine hauls, using a 25-foot, 1/4-inch mesh bag seine, was completed. The electroshocker was 230 volt, 3 phase unit used and provided by E. Butch Atwood, Southern Streams Project Office, Illinois Department of Conservation. All fish were identified, weighed, measured and returned to the water. Individuals unable to be identified in the field were preserved and identified in the lab.

Water chemistry readings for a number of parameters were also taken at the six sampling stations. Conductivity readings were taken using a Hach mini-conductivity meter. Dissolved oxygen, pH, total hardness and total alkalinity were taken using a Hach Water Ecology Kit, Model AL-36B. Water temperature was taken six inches below the surface near the middle of the body of water with a standard thermometer. Water clarity was determined using a Secchi disk.

A set of 1979 color aerial photographs (scale 1:24,000) and a base map (1:14,400) were supplied by the St. Louis District for the study area. Aquatic habitat types delineated for this portion of the study were riverine and lake. Riverine is defined as comprised of all live drainages including streams and ditches. Lake is defined as permanently flooded, shallow water bodies. As a result of their linear nature, the length of ditches were measured and multiplied by an average width of 15 feet to obtain area. The same technique was used for the streams bordering the District. Indian Creek was assumed to have an average width of 50 feet and Willow Creek an average width of 10 feet. Half of Willow Creek was not included assuming, this portion to be part of Meredosia, Willow Creek and Coon Run Drainage and Levee District, which is being evaluated in a separate report.

Diversity and equitability equations used for fishery populations were taken from Weber (1973) as follows:

$$\text{Diversity} = \frac{C}{N} (N \log_{10} N - \sum n_i \log_{10} n_i)$$

Where C = 3.321928

N = total number of individuals

n_i = number of individuals per taxa

$$\text{Equitability} = \frac{\text{number of species expected}}{\text{number of taxa in the sample}}$$

RESULTS AND DISCUSSION

Habitat Types

The amount of aquatic habitats present in the Meredosia Lake and Willow Creek Drainage and Levee District is given in Table 1. Lake habitat is absent within the District. However, Meredosia Lake, a 1,484 acre Illinois River bottomland lake, is located adjacent to most of the west boundary of the District. A description of the physical characteristics of Lake Meredosia is given in Lee et al. (1976), Havera et al. (1980), and Steffeck et al. (1980). The area between Lake Meredosia and the Illinois River is a National Wildlife Refuge.

The riverine habitats present within the study area, which make up 1.4 percent of the District, have all been either created or disturbed by man. Riffles are absent from all riverine habitat of the study area except for the upper reaches of Willow Creek.

Streams

The streams bordering the district, Indian Creek on the north and Willow Creek on the south, have both been channelized but differ in many ways. Indian Creek is relatively fast flowing, and has a well developed riparian zone with considerable bank cover and some trees that provide a degree of shading. Willow Creek by contrast, has a slower current and except for its extreme upper and lower ends within the District, is virtually devoid of trees and shrubs. Its banks are heavily grazed. In addition, Willow Creek is much narrower than Indian Creek and has less instream cover.

Ditches

The ditches within the District have been created by man in order to drain the interior of the District. The ditches are somewhat dissimilar having differences in instream and bank cover. Ditch #1 drains the northwest portion of the District and generally lacks any trees for bank cover. Roscoe Hardwick, a District Commissioner, said that the upper portion of the ditch used to be covered with trees but they were removed several years ago. Ditch #2 drains the southwest portion of the District and its lower portions are similar to, but has more instream cover than, Ditch #1. The upper portions near AR10 (Figure 5) contain wetland vegetation dominated by cattails, pickerelweed and sedges. The bank cover along the area of TR10 is mainly trees which provide shading. Pankey Pond ditch drains the eastern portion of the District. This ditch has the most bank cover especially in its middle and portions of its upper reaches. This cover helps reduce sediment input from sheet and bank erosion, evidenced by the fact that water clarity is much better here than any other ditch in the District. Instream cover is also fairly extensive. Mr. Hardwick said that this ditch has not been cleared or dredged in quite a number of years.

Other

Two other similar types of riverine habitat exist in the District. The old channelized portion of Mud Creek (Aquatic Sampling Station #3) is present in the extreme northeast portion of the District. Trees are absent from

Mud Creek but the banks are covered with grasses. Borrow/ditches are adjacent to the levees in the extreme southwestern portion of the District. One area is south of the side levee within the District and the other borrow/ditch area is adjacent to but outside the south end of the riverfront levee. Both of these areas have bank cover that shades a portion of the area. They also have excellent instream cover.

Water Chemistry

Table 10 gives the water chemistry data collected at the six aquatic sampling stations (Figure 5). Water clarity was generally less in Indian Creek, slightly better in the ditches and excellent in the borrow/ditch. This is probably related to current velocity (the greater the velocity the more sediment the water can carry and the less clear it becomes). Station 4 was sampled when the water was slightly high following a precipitation event which explains its difference from the other ditches. Dissolved oxygen varied between the sites presumably due to differences in flows, fertility, algal populations and organic decomposition. The pH ranged between 7.0 and 8.0 for all sites. Total hardness and alkalinity were generally similar for all stations. Exceptions were at station 1 for total hardness and station 4 for total alkalinity. These variances may have resulted from operator error. Conductivity ranged between 500 and 600 micromhos per centimeter. The water temperature varied substantially among and within the stations. This indicates that precipitation events, groundwater seepage, time of day and amount of cloud cover can all have a major effect on water temperature. Presumable causes include lack of shading and water originating from runoff, as opposed to less temperature variable springs.

Plankton-Phytoplankton

Phytoplankton collected at the six aquatic sampling stations (Figure 5) is shown in Table 11. The phytoplankton in the study area were generally dominated, in both number of taxa and density, by Chlorophyta (green algae) and Chrysophyta (diatoms and others). Except for station 6, the phytoplankton concentrations were relatively low and the genera for all stations are generally common in Illinois waters at this time of year (Louis Lipsey p.c.).

The most common Chrysophyta taxa collected were Dinobryon, Nitzschia and Navicula. These are large genera found throughout the country. Dinobryon is a Chrysophyceae, or non-diatom, that is widespread in lakes and occurs frequently in pools and ditches (Smith 1950). The Chlorophyta collected most often was the genus Chlamydomonas, nearly 30 species have been recorded in the United States. Although less abundant than the previously discussed taxa, Anabaena and Oscillatoria of the Division Cyanophyta (blue-green algae) were common in stations 5 and 6. Anabaena often occurs in abundance and may cause algal blooms, and Oscillatoria is one of the most ubiquitous of algae (Smith 1950). These data are generally similar to those found on Nutwood, Hartwell and Hillview Drainage and Levee Districts (Axtell and Humes 1981; Wapora, Inc. 1981; ESE 1982b).

A total of 32 phytoplankton taxa were collected at the six sampling stations in the District. Stations 2 and 5 had the largest number of taxa,

TABLE 10. Water Chemistry Data for Aquatic Sampling Stations on Meredosia Lake and Willow Creek Drainage and Levee District.

	STATION 1	STATION 2	STATION 3	STATION 4	STATION 5	STATION 6
Date	July 14, 1982	July 14, 1982	July 15, 1982	June 29, 1982	July 15, 1982	June 25, 1982
Clarity (in inches)	6.5	8.5	8.5	2.5	8.5	17.0
Dissolved Oxygen (ppm)	8.0	11.0	6.0	3.6	6.0	3.0
pH	8.0	8.0	7.8	7.0	7.8	7.5
Total Hardness (ppm)	>1740.0	255.5	342.0	171.0	273.6	273.6
Total Alkalinity (ppm)	307.8	222.3	307.8	>855.0	256.5	290.7
Water Temperature OF/OC	72.0/22.2	70.0/21.1	66.0/18.9	67.0/19.4	72.0/22.2	64.0/17.8
Water Temperature OF/OC ¹	70.7/21.5	77.0/25.0	77.0/25.0	68.9/20.5	71.1/21.7	77.0/25
Conductivity ¹ (µmhos/cm)	580	500	550	500	520	600

¹ - Date for these data was May 18, 1982.

TABLE 11. Phytoplankton Taxa Collected at the Aquatic Sampling Stations on Meredosia Lake and Willow Creek Drainage and Levee District, May 19, 1982.

Taxa	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6	
	#/ml	percent	#/ml	percent	#/ml	percent	#/ml	percent	#/ml	percent	#/ml	percent
Chrysophyta												
<u>Amphora</u>			1.89	0.8								
<u>Anomoeoneis</u>			1.89	0.8								
<u>Cocconeis</u>									0.96	0.5		
<u>Cyclotella</u>			7.55	3.1			0.32	0.6				
<u>Cymatopleura</u>			3.78	1.6			5.32	10.4	49.87	27.9	1263.00	68.3
<u>Dinobryon</u>	10.64	7.6	10.64	4.4			0.96	1.9	0.96	0.5		
<u>Gomphonema</u>			5.67	2.4	0.32	1.5			0.96	0.5		
<u>Gyrosigma</u>					0.96	4.5	0.32	0.6	50.00	27.9		
<u>Melosira</u>	3.72	2.7	5.67	2.4	3.51	16.5	5.11	9.9	21.15	11.8		
<u>Navicula</u>	7.45	5.3	156.75	65.5	2.87	13.5	8.62	16.8	18.27	10.2		
<u>Nitzschia</u>	74.78	53.6										
<u>Pinnularia</u>			1.89	0.8								
<u>Stauroneis</u>			1.89	0.8								
<u>Stephanodiscus</u>									1.92	1.1	3.0	0.2
<u>Surirella</u>					0.32		0.6		0.96	0.5		
<u>Synedra</u>	7.45	5.3			0.32		0.6		0.96	0.6		
Chlorophyta												
<u>Ankistrodesmus</u>									1.60	0.9	18.00	1.0
<u>Characium</u>	2.66	1.9										
<u>Chlamydomonas</u>	13.30	9.5			13.30	62.5	18.62	36.3			132.0	7.1
<u>Closterium</u>			2.66	1.1								
<u>Eudorina</u>	2.66	1.9									9.00	0.5
<u>Oedogonium</u>			10.11	4.2					2.39	1.3		
<u>Pandorina</u>									0.40	0.2		
<u>Pediastrum</u>									0.40	0.2	3.00	0.1
<u>Scenedesmus</u>			2.66	1.1					0.80	0.5	9.00	0.5
<u>Staurastrum</u>	2.66	1.9	2.66	1.1					0.40	0.2		

Table 11 continued.

Taxa	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6	
	#/ml	percent	#/ml	percent	#/ml	percent	#/ml	percent	#/ml	percent	#/ml	percent
<u>Cyanophyta</u>												
<u>Anabaena</u> ²	3.72	2.7	8.51	3.6								
<u>Oscillatoria</u>					8.78	17.1	23.54	13.2	398.70	21.6		
<u>Euglenophyta</u>												
<u>Euglena</u>	10.64	7.6	7.98	3.3								
<u>Phacus</u>					2.66	5.2	1.60	0.9	3.00	0.2		
<u>Trachelomonas</u>			5.32	2.2			0.40	0.2	9.00	0.5		
<u>Cryptophyta</u>												
<u>Cryptomonas</u>							1.60	0.9				
Total #/ml	139.38	100.0	239.41	100.0	21.28	100.0	51.35	100.0	179.14	100.0	1847.70	100.0
Total Taxa:	32	11	18	6		11	20	10				

1 - Number of colonies per milliliter.

2 - Total filament length per milliliter.

18 and 20, respectively. Stations 1 and 2 were dominated by Chrysophyta of the genus Nitzschia. This genus comprised about 54 and 65 percent of the total number per milliliter at each respective station. Stations 3 and 4 had green algae populations of the genus Chlamydomonas, dominating the samples. Substantial numbers of Chrysophyta also occurred. Chrysophyta genera composed over 75 percent of the numbers per milliliter at station 5. Relatively much larger populations were present at Station 6, the vast majority of which were Dinobryon (68 percent) and Anabaena (22 percent). The high populations at this station may be explained by the fact that the borrow/ditches are more lake-like than other sampling areas.

Most of the genera collected in the District are widespread with broad ecological tolerances. In general, chlorophyta taxa are more tolerant of, and may be abundant in areas of organic pollution. Cyanophyta are generally associated with high nutrient levels and become abundant in eutrophic waters.

Zooplankton

The zooplankton community was sampled at the six aquatic sampling stations (Figure 5) and the results are given in Table 12. The populations within Meredosia Lake and Willow Creek Drainage and Levee District are dominated by organisms from the taxa Rotifera (Rotifers), Cladocera (water fleas), Copepoda (copepods) and Diptera (midges). In general, population levels were similar in the ditch habitats, lower in Indian creek and elevated in the borrow/ditch sampling site.

The most common rotifer's collected both in frequency and number were of the genus Cephalodella. This genus has many species, some of which are very common (Pennak 1953). The water fleas collected were dominated by the species Chydorus sphaericus which is widely distributed and the daphnid Scapholeberis kingi. The copepods most commonly found include Cyclops vernalis, Eucyclops agilis and undetermined nauplii. The two identified species are common and widely distributed (Pennak 1953). Midges, members of the order Diptera, family Chironomidae, were collected at every station. These organisms are common, especially in silt substrates. The taxa collected in this study appears most similar to those collected at Nutwood District (Axtell and Humes 1981). Although similarities exist with Hartwell (Wapora, Inc. 1981) and Hillview (ESE 1982b) Districts, our sites were not dominated by rotifers, although they were quite common.

A total of 57 zooplankton taxa were collected at the six aquatic sampling sites located within the district. A striking feature is the lack of diversity and numbers at the Indian Creek site. Stations 2 to 6 varied from 17 to 28 taxa present, however, station 1 had only seven taxa present. This may be the result of the relatively fast current and sand substrate versus the ditch, mud bottom habitat present at the other sites. A second striking feature is the very high populations present at station 6, which were dominated by a single species. This may be related to the high numbers of phytoplankton present at this site.

Station 1 was dominated by copepod nauplii which composed 29 percent of the total numbers per cubic meter and midge or chironomid larvae which totaled about 21 percent. Station 2 was dominated by water fleas, Chydorus

TABLE 12. Zooplankton Collected at the Aquatic Sampling Stations on Meredosia Lake and Willow Creek Drainage and Levee District, May 19, 1982.

Taxa	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6	
	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent
Protozoa												
Sarcodina												
Rhizopoda												
Diffugiidae												
Diffugia corona	101	1.4			101	0.8	34	1.3	202	2.5	4718	2.1
D. oblonga	101	1.4					34	1.3	67	0.8	674	0.3
D. urceolata											674	0.3
Arcellidae												
Arcella sp.	67	0.9					34	1.3				
Ciliata												
Spirotrichida												
Stentoridae												
Stentor sp.							34	1.3				
Coelenterata												
Hydrozoa												
Hydridae					34	0.3						
Hydra sp.												
Platyhelminthes												
Trematoda												
Cercaria larva					34	0.3						
Turbellaria												
Rhabdocoela												
?Typhloplanidae												
Macrostomida												
Microstomidae												
Microstomum sp.	34	0.5					34	1.3			34	<0.1

TABLE 12 continued.

Taxa	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6	
	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent
Mollusca												
Gastropoda												
Lymnaeidae												
<u>Lymnaea sp.</u>			67	0.5								
Annelida												
Oligochaeta												
Naididae												
Chaetogaster sp.							34	1.3			34	<0.1
<u>Nais barbata</u>												
Arthropoda												
Arachnida												
Acarina												
Oribatei												
Eremaeidae												
?Hydrozetes			34	0.3					67	0.9		
Mites (Terrestrial?)			135	1.1					202	2.5		
Crustacea												
Ostracoda												
Podocopa												
Cypridae			67	0.6					34	0.4		
<u>Cypridopsis vidua</u>											1348	0.6
Cladocera												
Bosminidae												
<u>Bosmina longirostris</u>							101	4.0			10,784	4.8
Chydoridae												
Chydorus sphaericus	67	14.2	4381	59.9	135	1.1	135	5.3	169	2.1	3700	1.7
<u>Leydigia</u>												
quadrangularis	34	7.2										
Pleuroxus denticulatus			438	6.0					67	0.8	337	0.2

TABLE 12 continued.

Taxa	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6	
	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent
<u>Daphniidae</u>												
<u>Ceriodaphnia quadrangula</u>									18,872		8.5	
<u>Daphnia pulex</u>	34	0.5							337		0.2	
<u>Scapholeberis kingi</u>	303	4.1					202	7.9	1618	20.1	170,859	76.8
<u>Simocephalus serrulatus</u>	135	1.8							674		0.3	
<u>Macrothricidae</u>												
<u>Ilyocryptus sordidus</u>									67	0.9		
<u>Moinidae</u>												
<u>Moina ? affinis</u>									1348		0.6	
<u>Copepoda</u>												
<u>Calanoida</u>												
<u>Diaptomidae</u>												
<u>Diaptomus sanguineus</u>									1685		0.7	
<u>Cyclopoida</u>												
<u>Cyclopidae</u>												
<u>Cyclops vernalis</u>					67	0.5			1011	12.6		
<u>Eucyclops agilis</u>	34	7.2	674	9.2	3808	31.4					4044	1.8
<u>Macrocyclus albidus</u>			67	0.9								
<u>Nauplii</u>	135	28.6			4078	33.6	573	22.4	1045	13.0		
<u>Collembola</u>												
<u>Isotomidae</u>					270	2.2	34	1.3	101	1.3		
<u>Poduridae</u>												
<u>Podura aquatica</u>			67	0.9			34	1.3	67	0.8	101	0.1
<u>Sminthuridae</u>							34	1.3	34	0.4		
<u>Insecta</u>												
<u>Ephemeroptera</u>												
<u>Baetidae</u>	34	0.5										

TABLE 12 continued.

Taxa	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6	
	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent	m ³	percent
Homoptera												
Psyllidae (terrestrial)			34	0.5			101	4.0	34	0.4		
Hemiptera												
Gerridae												
Rheumatobates sp.											34	<0.1
Veliidae												
Microvelia sp.					337	2.8					34	<0.1
Corixidae												
Tricoptera												
Polycentropodidae							34	0.4				
Coleoptera												
Dytiscidae							67	0.8				
Diptera												
Chaoboridae												
Chaoborus sp.							34	1.3	34	0.4		
Chironomidae	101	21.4	404	5.5	944	7.8	337	13.2	1078	13.4	101	0.1
Simuliidae			34	0.5								
Sphaeroceratidae (terrestrial)												
Hymenoptera									34	0.4		
Formicidae												
ant (terrestrial)					34	0.3						
wasp (terrestrial)					34	0.3						
Total Taxa:	57	7	20		22		17		26		28	
Total Number												
per m ³ :	472	100.0	7,313	100.0	12,135	100.0	2,563	100.0	8,054	100.0	222,482	100.0

1 - Present but unable to count.

sphaericus, at about 60 percent and also comprised of copepods at 10 percent. Station 3 had substantial numbers of copepods, Eucyclops agilis (31 percent) and nauplii (33.6 percent) as well as 8 percent chironomids. The most common taxa collected at station 4 were: rotifers of the genus Cephalodella, 29 percent; copepod nauplii, 22 percent; and midge larvae, 13 percent. Station 5 was not dominated by a single taxa but had substantial numbers of rotifers, daphnia, copepods and chironomids. The population structure at station 6 was dominated by the daphnid Scapholeberis kingi which was present in large numbers and composed 77 percent of the total numbers. Other common taxa included another daphnid, Ceriodaphnia quadrangula (8.5 percent) and the cladoceran, Bosmina longirostris (4.8 percent).

Zooplankters are generally dependent and interrelated with the phytoplankton community, upon which they depend for food. Most of the cladocera collected are common open water and limnetic forms (Pennak 1953). The copepods present are mostly limnetic (Cyclops vernalis) or bottom (Eucyclops agilis) forms. The chironomids are bottom dwelling species. The rotifers in general occur in a variety of habitats but 75 percent occur in littoral areas of lakes (Pennak 1953).

Benthic Macroinvertebrates

The organisms collected from the six aquatic sampling stations (Figure 5) are given in Table 13. The benthic macroinvertebrates in the study area are dominated in both numbers and frequency at all sites by oligochaetes (aquatic earthworms) and dipteran chironomids (midges). These organisms are common in silt substrates and are tolerant of low dissolved oxygen levels (Havera et al. 1980). These organisms were also dominant at Hillview Drainage and Levee District (ESE 1982b), although present in greater numbers.

All of the stations were dominated by oligochaetes and midges. A total of six taxa were collected, but identification was only to family because of the difficulty and resulting inaccuracy, of keying to lower taxonomic levels. For this reason and because oligochaetes and chironomids are pollution tolerant and therefore indicators of a disturbed environment, diversity and equitability indices were not completed. Except for stations 4 and 6, oligochaetes represented at least 65 percent of the total numbers. At station 4, the two dominant organisms were about equal in number and chironomids represented 61 percent of the total numbers at station 6. Although no live specimens were taken, old snail shells were collected in the bottom samples at every station indicating they were recently present or may be present in low numbers. In addition, live snails, crayfish, mayflies and water boatmen were coincidentally collected on the District during fish sampling.

The complete dominance of the benthic macroinvertebrate fauna by oligochaetes and chironomids indicates that pollution tolerant and widely distributed benthic organisms are adapted to conditions found in the District. Run-off from the predominantly agricultural lands with its associated high silt and, at certain times of the year, herbicide and pesticide loads is probably responsible for the lack of diversity. Indian Creek had notably small benthic populations, similar to its poor

TABLE 13. Benthic Macroinvertebrates Collected at the Aquatic Sampling Stations on Meredosia Lake and Willow Creek Drainage and Levee District, June and July, 1982.

Taxa	STATION 1		STATION 2		STATION 3		STATION 4		STATION 5		STATION 6	
	#/m ²	percent	#/m ²	percent	#/m ²	percent	#/m ²	percent	#/m ²	percent	#/m ²	percent
Oligochaeta	17	65.4	1515	70.1	861	86.9	422	50.5	301	67.3	138	34.8
Amphipoda												
<u>Hyaella azteca</u>			9	0.4			9	1.1				
Decapoda												
Astacidae*												
Insecta												
Ephemeroptera*												
Ephemeridae*												
Odonata												
Gomphidae					9	0.9						
Hemiptera												
Corixidae*												
Coleoptera												
Chrysomelidae							9	1.1				
Diptera												
Chironomidae	9	34.6	577	26.7	112	11.3	396	47.3	146	32.7	241	60.9
Ceratopogonidae			60	2.8	9	0.9					17	4.3
Gastropoda ¹	4	species	2	species	1	species	3	species	1	species	1	species
Pelecypoda ¹	1	species	1	species								
Total Taxa:	6		4		4		4		2		3	
Total #/m ² :	26	100.0	2161	100.0	991	100.0	836	100.0	447	100.0	396	100.0

* - Collected while seining; not included in totals.

1 - Old shells not included in totals.

zooplankton populations, probably related to its relatively rapid current and sand bottom. Station 2 had the largest populations which may be the result of its slightly more forested banks reducing the run-off entering the system.

Fisheries

The species, abundance and diversity of fish collected at the six aquatic sampling stations (Figure 5) are given in Table 14. The weight and standing crop estimates for each station are presented in Table 15. The species most often collected were carp and members of the family Centrarchidae. There were four minnow species relatively abundant in the study area, with emerald shiners and red shiners each dominant at a single, separate station. These data are generally similar to what has been found at other drainage and levee districts along the lower Illinois River, except for much smaller numbers of gizzard shad collected during this study (Axtell and Humes, 1981; Wapora, Inc., 1981; ESE, 1982b). For a discussion of fish populations along the Illinois River see Sparks and Starrett (1975) and Havera et al. (1980). Fish species found within Cass and Morgan counties are discussed in Rogers (1971) and Rogers (1970).

In general, the seining and electrofishing methods worked well together and counteracted inherent deficiencies in the other technique. Although this will give a representative sample that should include most of the species present and their relative abundance, the standing crop estimates will always be less than actual conditions. Because some fish will be missed or escape over or through the block seines, the standing crop estimates are subject to variability and error. If it is deemed that standing crop figures are mandatory, a chemical piscicide in association with block seines should be completed in future studies.

The diversity and equitability indices should likewise be evaluated with caution. Generally, the diversity index for unpolluted waters falls between 3 and 4, whereas in polluted water the figure is less than one. The equitability index, a more sensitive degradation indicator, ranges from 0.6 to 0.8 in high quality areas and even slight amounts of pollution reduce it to below 0.5. However the estimates improve with increased sample size and samples with less than 100 specimens result in questionable conclusions (Weber 1973).

The six aquatic sampling sites were located in stream, ditch and borrow/ditch habitats. Site 1 was located on Indian Creek which, at the time of sampling, was a turbid, sandy bottom stream with moderate instream cover. Sites 2, 4, and 5 were located on drainage ditches in various places throughout the District. Site 3 was on a channelized portion of Mud Creek that had a slow current and mud bottom with very limited instream cover. Site 6 was located on a borrow/ditch area that had a mud and detritus bottom with extensive instream cover. A more detailed description of the habitat types is given in a previous section of this report.

Differences are evident in fish population structure and abundance among sampling stations. In general, the ditches were relatively similar, Indian Creek's fish population was low and the borrow/ditch site (station 6) had higher numbers of fish present than the other areas.

TABLE 14. Species, Abundance and Diversity of Fish Collected from Aquatic Sampling Stations in Meredosia Lake and Willow Creek Drainage and Levee District, June and July 1982.

Common Name	Scientific Name	STATION 1	STATION 2	STATION 3	STATION 4	STATION 5	STATION 6	TOTAL
		#	#	#	#	#	#	#
Bowfin	<u>Amia calva</u>					1	1	1
Gizzard shad	<u>Dorosoma cepedianum</u>					1	0.9	1
Grass pickerel	<u>Esox americanus</u>	1	2.4		1	6.6		2
Carp	<u>Cyprinus carpio</u>	5	11.9	41	28.1	6	5.6	141
Golden shiner	<u>Notemigonus crysoleucas</u>			2	1.4	10	9.3	22
Emerald shiner	<u>Notropis atherinoides</u>	3	42.9	79	54.1	61	56.5	69
Red shiner	<u>N. lutrensis</u>	3	42.9	20	13.7	7	6.5	90
Silvery minnow	<u>Hybognathus nuchalis</u>			1	0.7			27
Fathead minnow	<u>Pimephales promelas</u>	1	2.4	1	0.7			2
Bigmouth buffalo	<u>Ictalurus cyprinellus</u>	2	4.8	1	0.7			1
Yellow bullhead	<u>Ictalurus natalis</u>			2	1.3			5
Mosquitofish	<u>Gambusia affinis</u>							2
Largemouth bass	<u>Micropterus salmoides</u>	1	42.9			1	6.7	151
Green sunfish	<u>Lepomis cyanellus</u>					4	3.7	15
Bluegill	<u>L. macrochirus</u>			2	13.3	9	8.3	33
Green sunfish	<u>L. cyanellus</u>					8	7.4	26
x bluegill	x <u>L. macrochirus</u>							25
Black crappie	<u>Pomoxis nigromaculatus</u>					94	22.7	94
Total Number:		7	100.	146	100.	108	100.	732
Total Species:		3	10	7	5	9	9	17
Diversity Index:		1.45	3.02	1.65	1.56	0.79	2.36	3.187
Equitability:		1.13	1.19	0.57	0.74	0.22	0.78	0.76

1 - Electrofishing results.
2 - Seining results.

TABLE 15. Abundance, Weight and Standing Crop of Fish Collected at Aquatic Sampling Stations in Meredosia Lake and Willow Creek Drainage and Levee District, June and July 1982.

Common Name	Scientific Name	STATION 11/ #	STATION 2 height/ft	STATION 3 #	STATION 4 weight	STATION 5 weight	STATION 6/ weight
Bowfin	<u>Amia calva</u>					1	3.07
Gizzard shad	<u>Dorosoma cepedianum</u>				1	0.12	
Grass pickerel	<u>Esox americanus</u>			1	0.07		
Carp	<u>Cyprinus carpio</u>	1	0.25	41	6.50	6	4.42
Golden shiner	<u>Notemigonus crysoleucas</u>	5	2.16	2	0.08	10	0.13
Emerald shiner	<u>Notropis atherinoides</u>	5	0.03	79	0.81	61	0.31
Red shiner	<u>N. lutrensis</u>			20	0.24	7	0.04
Silvery minnow	<u>Hybognathus amabilis</u>	7	0.05	1	0.01		
Fathead minnow	<u>Pimephales promelas</u>	1	0.01	1	0.01		
Bigmouth buffalo	<u>Ictiobus cyprinellus</u>						
Yellow bullhead	<u>Ictalurus natalis</u>	2	0.30	1	0.50	1	0.40
Mosquitofish	<u>Gambusia affinis</u>			2	0.01	2	0.08
Largemouth bass	<u>Micropterus salmoides</u>	5	0.42			2	0.26
Green sunfish	<u>Lepomis cyanellus</u>	10	0.49			4	0.05
Bluegill	<u>L. macrochirus</u>	4	0.32	2	0.10	9	0.42
Green sunfish x bluegill	<u>L. cyanellus x L. macrochirus</u>	2	0.09			8	0.19
Black crappie	<u>Pomoxis nigromaculatus</u>					25	1.79
						94	0.36
Total Number:		7	42	146	15	108	414
Total Weight:			4.12	8.48	0.42	5.94	42.65
Standing Crop - lbs./acre:		0.05	59.8	147.8	7.3	95.8	
Number/acre:		610	2,544	261	1,742	100	200
Sampling Station Length (in feet):		200	100	100	100	100	200

1 - No standing crop estimates because block nets were unable to be set.

2 - In pounds.

Site 1 on Indian Creek had, by far, the lowest numbers of species and total specimens collected. This may be partially the result of difficulties encountered with the relatively rapid current velocity which impeded our ability to collect fish. However, the low plankton and macroinvertebrate populations are indicative of reduced productivity at this site. In addition, a reduction of these organisms at the base of the food chain will depress dependent fish populations.

The data for stations 2 through 5 are relatively similar. This is related to the basic resemblance of the ditch aquatic habitat. Station 2 had the greatest species diversity. The increased bank and instream cover along this ditch are probably the causative factors. There was virtually no instream cover at site 3, which may be the cause for the lack of predatory sport fish present. The low population and diversity at Station 4 may be related to recent clearing along this section of ditch. Few trees currently grow on the ditch bank; therefore, shading is minimal. Instream cover is also lacking. Station 5 undergoes dramatic changes in current velocity when the pump is turned off or on. Because of the presence of abundant instream cover, more species were collected at this site than at the previous two stations. In general, the fish populations found in the ditches within the District are fairly typical of populations expected in this type of habitat. One exception is the presence of grass pickerel at stations 2 and 4. Although tolerant of turbid water, they prefer clear water with aquatic vegetation and have been adversely affected by drainage (Smith 1979). Pankey Pond ditch has increased species diversity because instream cover and shading from bank cover provide better quality aquatic habitat.

Station 6 is located at a borrow/ditch site. The fish population structure at this site differs markedly from all other sample areas. Whereas the other stations all had relatively abundant populations of minnows, in this area no minnows were collected. However, large numbers of carp were present and three species, bowfin, bigmouth buffalo and black crappie, were only collected at this site. The most striking feature of the population structure was the very high numbers of centrarchids present, especially young largemouth bass and black crappie (Appendix C). Even though dissolved oxygen was low (3 ppm), the presence of high plankton populations is conducive to larval and young fish development and was being utilized by centrarchids notably largemouth bass and crappie. This area is a surprisingly good breeding and nursery area for centrarchids and also supports a high carp population.

The fish species collected in Meredosia Lake and Willow Creek Drainage and Levee District are common and widespread throughout Illinois. The most sensitive species were grass pickerel and members of the family Centrarchidae. Even these species are somewhat tolerant of turbid conditions, although they prefer clear water with aquatic vegetation. The fish population structure present is indicative of what would be expected in an intensively cultivated area. The most unusual and productive fisheries resource present within the District is the breeding and nursery habitat provided by the borrow/ditch area at aquatic sampling station 6.

Sport Fishing

No written accounts of sport fishing within the District were found. An account of fishing opportunities within Cass and Morgan counties is given in Rogers (1971) and Rogers (1970). Sport fish most commonly found within the District include largemouth bass, yellow bullhead, a number of species of sunfish, crappie and carp. In discussions with local fishermen, they stated that once in a while a grass pickerel and channel catfish are caught within the District.

Signs of fishing were noted at many of the ditch-road intersections. The most commonly fished areas observed were at the pump house, the borrow/ditch areas such as at aquatic sampling site 6, the old channel of Mud Creek, the lower portion of Willow Creek and Pankey Pond Ditch.

Threatened and Endangered Species

A list of the state and federal threatened and endangered fish and mussels is given in Table 16. The Illinois Department of Conservation does not list any of these fish species as occurring in Cass or Morgan counties (Natural Land Institute 1981). It is probable that none of the fish species would occur in the study area, the only plausible species that could occur is the blacknose shiner. This shiner occurs in clear, sand-bottomed streams and its population had been decimated primarily by siltation. Indian Creek is sand-bottomed, however, its high turbidity probably excludes the presence of the blacknose shiner.

The Higgin's eye and pink mucket mussels could be found in the Illinois River near the study area. The presence of these species within or contiguous to the Meredosia Lake and Willow Creek Drainage and Levee District is improbable.

SUMMARY OF FINDINGS

The aquatic habitats in Meredosia Lake and Willow Creek Drainage and Levee District have been altered by intensive farming practices, channelization, drainage and the construction of ditches. The diverse interacting array of lakes, streams and sloughs that occurred before the District was formed has been replaced by drainage ditches and channelized streams. Indian Creek borders the north edge of the District and Willow Creek forms the south boundary. Approximately 44 miles of ditches exist within the district which total about 80 acres of the 106 acres of riverine habitat. No lakes occur within the District, but the 1,484 acre Meredosia Lake forms a portion of the western boundary.

The water chemistry in the District was relatively consistent for pH, hardness and alkalinity. Dissolved oxygen and temperature varied considerably presumably due to a number of factors. Water clarity was generally poor in Indian Creek, slightly better in most of the ditches and best in the borrow/ditch area and the upper portion of Pankey Pond ditch. Phytoplankton populations were dominated by green algae and Chrysophyta (diatoms and others). Populations were relatively low except in the borrow/ditch area. Zooplankton populations were dominated by rotifers, Cladocera, copepods and midges. Benthic macroinvertebrates were dominated

TABLE 16. List of Threatened and Endangered Fish and Mussels Found in Illinois.

Common Name	Scientific Name	Classification*	
		A	B
Bigeye chub	<u>Hybopsis ampelops</u>	X	
Bluebreast darter	<u>Etheostoma camurum</u>	X	
Bluehead shiner	<u>Notropis hubbsi</u>	X	
Harlequin darter	<u>Etheostoma histrio</u>	X	
Longjaw cisco	<u>Coregonus alpenae</u>	X	
Cisco	<u>Coregonus artedii</u>		X
Longnose sucker	<u>Catostomus catostomus</u>		X
Alligator gar	<u>Lepisosteus spatula</u>		X
Pugnose shiner	<u>Notropis anogenus</u>		X
Blacknose shiner	<u>Notropis herterolepis</u>		X
Bantam sunfish	<u>Lepomis symmetricus</u>		X
Lake whitefish	<u>Coregonus clupeaformis</u>		X
Lake sturgeon	<u>Acipenser fulvescens</u>		X
Higgin's Eye	<u>Lampsilis higginsii</u>	X	
Pearly Mussel			
Pink Mucket	<u>Lampsilis orbiculata orbiculata</u>	X	
Pearly Mussel			
Orange-footed	<u>Plethobasis cooperianus</u>	X	
Pimpleback Mussel			
White Wartyback	<u>Plethobasis cicatricosus</u>	X	
Pearly Mussel			
Rough Pigtoe	<u>Pleurobema plenum</u>	X	
Pearly Mussel			
Sampson's Pearly	<u>Epioblasma sampsoni</u>	X	
Mussel			
Tubercled-blossum	<u>Epioblasma torulosa torulosa</u>	X	
Pearly Mussel			
White Cat's Paw	<u>Epioblasma sulcata delicata</u>	X	
Pearly Mussel			

* A State Endangered

B State Threatened

by oligochaetes and midges. Fish populations were generally what is expected in intensively cultivated interior aquatic habitats, however, the borrow/ditch area was an excellent breeding and nursery site for centrarchids. The species most often collected include carp, emerald and red shiners, and centrarchids. It is improbable that any threatened or endangered fish or mussels occur within the study area.

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APPENDIX A

**List of Plants Observed in Floodplain Forest Habitats on
Meredosia Lake and Willow Creek Drainage and Levee
District, June and July 1982, by Family and Common Name**

List of plants observed during terrestrial sampling of floodplain forest habitats on Meredosia Lake and Drainage and Levee District, June and July, 1982. Nomenclature from Jones (1971).

Thallophyta (mushrooms)

Bryophyta (mosses)

Spermatophyta

Aceraceae

Acer saccharinum (Silver Maple)

Acer negundo (Box Elder)

Anacardiaceae

Rhus sp. (Sumac, Poison Ivy)

Annonaceae

Asimina sp. (Paw Paw)

Asclepiadaceae

Asclepias sp. (Milkweed)

Betulaceae

Ostrya sp. (Hop Hornbeam)

Caprifoliaceae

Viburnum sp. (Viburnum)

Celastraceae

Euonymus sp. (Strawberry Bush)

Chenopodiaceae

Chenopodium sp. (Goosefoot, Lambs Quarters)

Commelinaceae

Tradescantia sp. (Spiderwort)

Compositae

Erigeron sp. (Fleabane)

Lactuca sp. (Lettuce)

Cornaceae

Cornus sp. (Dogwood)

Cucurbitaceae

Sicyos sp. (Wild Cucumber)

Cupressaceae

Juniperus sp. (Cedar)

Cyperaceae

Carex sp. (Sedge)

Dioscoreaceae

Dioscorea sp. (Wild Yam)

Ebenaceae

Diospyros sp. (Persimmon)

Euphorbiaceae

Euphorbia sp. (Spurge)

Fagaceae

Quercus sp. (Oak)

Gramineae (Grasses)

Grossulariaceae

Ribes sp. (Gooseberry)

Hypericaceae

Hypericum sp. (St. Johnswort)

Juglandaceae

Juglans sp. (Walnut)Carya sp. (Hickory)

Labiatae

Prunella sp. (Heal-all)Collinsonia sp. (Horseweed)

Lauraceae

Sassafras sp. (Sassafras)

Leguminosae

Gleditsia sp. (Honey Locust)

Leguminosae

Medicago sp. (Medic)Robinia sp. (Black Locust)

Liliaceae

Asparagus sp. (Asparagus)Smilacina sp. (False Solomon Seal)Smilax sp. (Greenbrier)

Phytolaccaceae

Phytolacca sp. (Pokeweed)

Podophyllaceae

Podophyllum sp. (Mayapple)

Polygonaceae

Polygonum sp. (Knotweed)

Oleaceae

Forestiera sp. (Swamp Privet)

Oxalidaceae

Oxalis sp. (Wood Sorrel)

Rosaceae

Potentilla sp. (Cinquefoil)

Geum sp. (Avens)

Rubus sp. (Raspberry)

Rosa sp. (Multiflora Rose)

Amelanchier sp. (Shadbush)

Prunus sp. (Wild Cherry)

Scrophulariaceae

Verbascum sp. (Mullen)

Tiliaceae

Tilia sp. (Basswood)

Ulmaceae

Ulmus sp. (Elm)

Celtis sp. (Hackberry)

Umbelliferae

Daucus sp. (Wild Carrot)

Urticaceae

Laportea sp. (Wood Nettle)

Urtica sp. (Stinging Nettle)

Violaceae

Viola sp. (Violet)

Vitaceae

Vitus sp. (Wild Grape)

Parthenocissus sp. (Virginia Creeper)

APPENDIX B

Field Notes For Terrestrial (Pages B-2 to B-56) and Aquatic
(Pages B-57 to B-72) Reconnaissance Sites.

Field Reconnaissance Sampling Sites and Habitat Types

<u>Terrestrial</u>		<u>Aquatic</u>	
<u>Sampling Site</u>	<u>Habitat Type</u>	<u>Sampling Site</u>	<u>Habitat Type</u>
1	Stream Border	1	Stream
2	Stream Border	2	Stream
3	Stream Border	3	Stream
4	Stream Border	4	Stream
5	Stream Border	5	Stream
6	Stream Border	6	Stream
7	Ditch Border	7	Ditch
8	Ditch Border	8	Ditch
9	Ditch Border	9	Ditch
10	Ditch Border	10	Ditch
11	Ditch Border	11	Ditch
12	Ditch Border	12	Ditch
13	Ditch Border	13	Ditch
14	Ditch Border	14	Ditch
15	Ditch Border	15	Ditch
16	Lake Border	16	Wetland
17	Stream Border		
18	Stream Border		
19	Floodplain Forest		
20	Floodplain Forest		
21	Floodplain Forest		
22	Floodplain Forest		
23	Floodplain Forest		
24	Floodplain Forest		
25	Floodplain Forest		
26	Floodplain Forest		
27	Floodplain Forest		
28	Floodplain Forest		

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #1 Indian CreekDate: 6/3/82Time: 11:30 amHabitat Type: stream borderWeather: cloudy, 55°Investigator(s): DWS GAP

Vegetative Cover

Overstory:

Crown Closure: 35% - some of the area recently clearedDominant Species: Willow, CottonwoodAge Classes: DBH 10-14 inches

Understory:

Percent Cover: 20%Dominant Species: Silver maple

Ground Cover:

Percent Cover: 80%Dominant Species: ragweed, wild cucumberGrass/Forb Ratio: 5/95

Wildlife

<u>Species</u>	<u>Sign</u>
<u>Yellowthroat</u>	<u>beaver - cuttings</u>
<u>Black-capped chickadee</u>	<u>raccoon - tracks</u>
<u>great blue heron</u>	<u>fox sp. - tracks</u>
<u>rose-breasted grosbeak</u>	
<u>white-throated sparrow</u>	
<u>red-winged blackbird</u>	
<u>American Toad</u>	
<u>grackle</u>	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) Relatively new growth
 volunteering after clearing. Probably will succeed to typical
 bottomland forest dominated by silver maple.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-4

Location: #2 Indian Creek

Date: 6/3/82

Time: 4:55 pm

Habitat Type: stream border

Weather: clear

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%

Dominant Species: —

Age Classes: —

Understory:

Percent Cover: 30%

Dominant Species: mulberry, sumac, willow

Ground Cover:

Percent Cover: 100%

Dominant Species: barryard grass, other grasses

Grass/Forb Ratio: 80/20

Wildlife

<u>Species</u>	<u>Sign</u>
Northern oriole	deer - tracks
barn swallow	pocket gopher
wood duck	E. mole
blue jay	
crow	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) there are a few volunteer trees pioneering in the grasses

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-6

Location: #3 Indian Creek

Date: 6/3/82

Time: 2:30 pm

Habitat Type: Stream border

Weather: 60% cloud cover - 68°F

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%

Dominant Species: -

Age Classes: -

Understory:

Percent Cover: 10%

Dominant Species: Mulberry, sumac

Ground Cover:

Percent Cover: 100%

Dominant Species: Bidens, 3 sp. of grasses, ragweed, grape

Grass/Forb Ratio: 60/40

Wildlife

<u>Species</u>	<u>Sign</u>
Kingbird	
Song sparrow	
red-winged blackbird	
grackle	
chimney swift	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) old field-border habitat, almost
all of the trees have been recently cut.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-8

Location: #4 Willow Creek

Date: 6/4/82

Time: 9:35 am

Habitat Type: stream border

Weather: rain, 55°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 10%

Dominant Species: Cottonwood

Age Classes: large - DBH 15-36 inches

Understory:

Percent Cover: 70% immediately bordering the creek

Dominant Species: silver maple, willow

Ground Cover:

Percent Cover: on bank 15%, most of the area is under water

Dominant Species: marsh smartweed growing through the water

Grass/Forb Ratio: 0/100

Wildlife

<u>Species</u>	<u>Sign</u>
red-winged blackbird	crayfish chimneys
red-bellied woodpecker	
grackle	
mourning dove	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse	X		
Succulents	X		

Comments: (den sites, successional trends, etc.) Most of area except for natural levee flooded with about 12 inches of water

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-10

Location: #5 Willow Creek

Date: 6/4/82

Time: 8:30 am

Habitat Type: Stream border

Weather: light rain - 55°F

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%

Dominant Species: —

Age Classes: —

Understory:

Percent Cover: 10%

Dominant Species: willow

Ground Cover:

Percent Cover: 85%

Dominant Species: grasses, smartweed, marsh milkweed

Grass/Forb Ratio: 60/40

Wildlife

<u>Species</u>	<u>Sign</u>
<u>grackle</u>	<u>pocket gopher</u>
<u>red-winged black bird</u>	
<u>house sparrow</u>	
<u>burn swallow</u>	
<u>killdeer</u>	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) maintained, grazed levee
and border, not very high quality habitat except potential for ground
nesting birds

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-12

Location: #6 Willow Creek

Date: 6/4/82

Time: 8:00 am

Habitat Type: Stream border

Weather: light rain 51°F

Investigator(s): Dws, CAP

Vegetative Cover

Overstory:

Crown Closure: 0%

Dominant Species: —

Age Classes: —

Understory:

Percent Cover: 50%

Dominant Species: willow, elm, cottonwood, walnut

Ground Cover:

Percent Cover: 75% (except on severe cutbanks where there's no vegetation)

Dominant Species: grasses, poison ivy

Grass/Forb Ratio: 50/50

Wildlife

<u>Species</u>	<u>Sign</u>
<u>Mallard</u>	
<u>bank Swallows</u>	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) potential for better mast production as walnuts get larger, no levees exist in this area. If tree's, forbs and grasses continue to succeed naturally potentially good habitats will occur. This portion does not appear to be channelized.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-14

Location: #7 Ditch 1

Date: 6/3/82

Time: 1:00 PM

Habitat Type: Ditch border

Weather: cloudy 63°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%

Dominant Species: —

Age Classes: —

Understory:

Percent Cover: 40% adjacent to ditch

Dominant Species: elm, dogwood

Ground Cover:

Percent Cover: 80%

Dominant Species: Equisetum, fox tail, grasses

Grass/Forb Ratio: 50/50

Wildlife

<u>Species</u>	<u>Sign</u>
group of 7 mallards	ground den - woodchuck or fox
rock dove	
red-winged blackbird	
horned lark	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) trees along ditch appear to have been cut about 5 years ago, now in early stages of succession

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #8 Ditch 1Date: 6/3/92Time: 5:40 pmHabitat Type: ditch borderWeather: clear 62°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%Dominant Species: —Age Classes: —

Understory:

Percent Cover: 10%Dominant Species: Ash, Sumac

Ground Cover:

Percent Cover: 60%Dominant Species: grape, Equisetum, smartweed, foxtailGrass/Forb Ratio: 30/70

Wildlife

<u>Species</u>	<u>Sign</u>
American goldfinch	
mourning dove	
robin	
ring-billed gulls	
red-winged blackbird	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse	X		
Succulents	X		

Comments: (den sites, successional trends, etc.) currently rather poor habitat, cultivated lands (plowed) only 6 ft. from ditch, unless larger border area is established - allowed to grow little wildlife habitat potential and erosion problems will continue.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #9 Ditch 1Date: 6/4/82Time: 11:00 amHabitat Type: Ditch borderWeather: cloudy 60°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%Dominant Species: —Age Classes: —

Understory:

Percent Cover: 40%Dominant Species: Sarcocornus, ash sp.

Ground Cover:

Percent Cover: 90%Dominant Species: grape, multiflora rose, dogwood, locustGrass/Forb Ratio: 20/80

Wildlife

<u>Species</u>	<u>Sign</u>
born Swallow	deer - tracks
red-headed woodpecker	
red-winged blackbird	
mourning dove	
Am. goldfinch	
grackle	
bob white	
Robin	
indigo bunting	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) north side with small trees, south side mostly forbs. Young trees starting to pioneer

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #10 Ditch 2Date: 6/15/82Time: 4:30 pmHabitat Type: ditch borderWeather: cloudyInvestigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%

Dominant Species: _____

Age Classes: _____

Understory:

Percent Cover: 75%Dominant Species: sassafras, dogwood, mulberry, black locust

Ground Cover:

Percent Cover: 75%Dominant Species: grasses, grape, 4-square stem unknown, lamb's
quarters, mullen, poison ivyGrass/Forb Ratio: 50/50

Wildlife

<u>Species</u>	<u>Sign</u>
Killdeer	crag fish chimney
red-winged blackbird	deer - tracks
yellowthroat	
American Bittern	
song sparrow	
grackle	
dickcissel	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	λ		
Browse		X	
Succulents		λ	

Comments: (den sites, successional trends, etc.)

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-22

Location: #11 Ditch 2

Date: 6/4/82

Time: 10:40 am

Habitat Type: ditch border

Weather: light rain

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%

Dominant Species: -

Age Classes: -

Understory:

Percent Cover: 0%

Dominant Species: -

Ground Cover:

Percent Cover: 80%

Dominant Species: grasses, smartweed

Grass/Forb Ratio: 65/35

Wildlife

<u>Species</u>	<u>Sign</u>
red-winged blackbird	cragfish chimney
northern oriole	snake skin
belted kingfisher	
mourning dove	
grackle	
leopard frog	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) signs of recreational
fishing evident

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-24

Location: #12 Ditch 2

Date: 6/4/82

Time: 11:20 am

Habitat Type: Ditch border

Weather: cloudy - 60°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 10%

Dominant Species: river birch, silver maple, ash

Age Classes: DBH 4-12 inches

Understory:

Percent Cover: 50%

Dominant Species: sumac, sassafras, mulberry, elm, dogwood

Ground Cover:

Percent Cover: 85%

Dominant Species: ragweed, grasses, smartweed, sedges, milkweed,
poison ivy

Grass/Forb Ratio: 50/50

Wildlife

<u>Species</u>	<u>Sign</u>
robin	deer - tracks
killdeer	raccoon - tracks
grackle	
red-winged blackbird	
bullfrog	
bobwhite	
brown-headed cowbird	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) Small ground den present.

Partly plowed field adjacent to this area is filled with sedges, fairly good habitat

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-26

Location: #13 Pankey Pond ditch

Date: 6/3/82

Time: 6:25 pm

Habitat Type: ditch border

Weather: clear 62°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 50%

Dominant Species: black cherry, elm, mulberry

Age Classes: relatively young DBH 6-10 inches

Understory:

Percent Cover: 65%

Dominant Species: elm, grape

Ground Cover:

Percent Cover: 90%

Dominant Species: wild carrot, cheat grass, wild strawberry, mullein,
thistle, grass sp.

Grass/Forb Ratio: 50/50

Wildlife

<u>Species</u>	<u>Sign</u>
brown thrasher	raccoon - scat
crayfish	cottontail
mourning dove	
red-winged blackbird	
mallard	
northern Oriole	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) good quality habitat
 about 15 feet on east side and 40 feet on the west side of the ditch

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-28

Location: #14 Pankey Pond ditch

Date: 6/14/82

Time: 5:30 pm

Habitat Type: ditch border

Weather: cloudy

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 20%

Dominant Species: silver maple

Age Classes: relatively young, DBH 6-10 inches

Understory:

Percent Cover: 80%

Dominant Species: dogwood, sumac, silver maple, mulberry, ash, elm,
oak

Ground Cover:

Percent Cover: 90%

Dominant Species: grasses, spiderwort, crown vetch, grape, bulrush,
smartweed

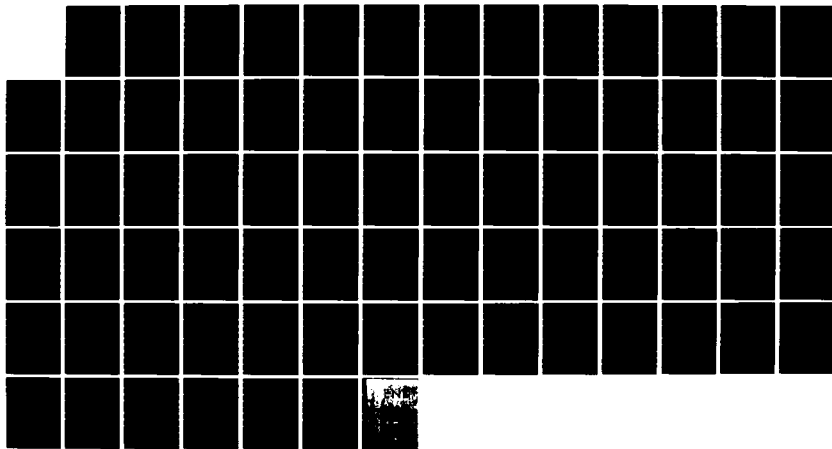
Grass/Forb Ratio: 35/65

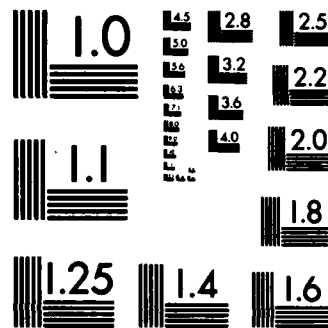
AD-A133 054 TERRESTRIAL AND AQUATIC BIOLOGICAL INVENTORY; MEREDOSIA 2/2
LAKE AND WILLOW C. (U) FISH AND WILDLIFE SERVICE ROCK
ISLAND IL D W STEFFECK DEC 82

AD-A133 054 TERRESTRIAL AND AQUATIC BIOLOGICAL INVENTORY; MEREDOSIA 2/2
LAKE AND WILLOW C. (U) FISH AND WILDLIFE SERVICE ROCK
ISLAND IL D W STEFFECK DEC 82

UNCLASSIFIED F/G 6/6 NL

UNCLASSIFIED F/G 6/6 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Wildlife

<u>Species</u>	<u>Sign</u>
indigo bunting	beaver - cuttings
robin	deer - tracks
red-winged blackbird	rabbit - tracks
Rane sp.	
mourning dove	
grackle	
horned lark	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) relatively young forested area but succeeding nicely. Hasn't been cleared in a number of years.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #15 Ponkey Pond ditchDate: 6/3/82Time: 4:20 pmHabitat Type: ditch borderWeather: clear 66°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 5%Dominant Species: sycamoreAge Classes: young DBH 6 inches

Understory:

Percent Cover: 50%Dominant Species: Ash sp., grape, black locust, willow

Ground Cover:

Percent Cover: 70%Dominant Species: ragweed, bedstraw, lambs quarters, smartweedGrass/Forb Ratio: 25/75

Wildlife

<u>Species</u>	<u>Sign</u>
red-winged black bird	opossum - tracks
grackle	fox - tracks
northern oriole	eastern mole
bluebird	
rough-winged swallow	
kingbird	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse	X		
Succulents	X		

Comments: (den sites, successional trends, etc.) trees beginning to pioneer along the ditch

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTOR

Location: #16 Riverward of west levee

Date: 6/14/82

Time: 2:30 pm

Habitat Type: bottomland, border of levee

Weather: 30% cloud cover

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 25%

Dominant Species: silver maple, willow, ash

Age Classes: older close to levee - DBH 14-16 inches; younger closer
to the lake DBH 8 inches to poles

Understory:

Percent Cover: 10%

Dominant Species: willows, swamp privet

Ground Cover:

Percent Cover: 5%, area is currently flooded with water

Dominant Species: marsh Smartweed growing through the water, some
very young willows + silver maples

Grass/Forb Ratio: 0/100

Wildlife

<u>Species</u>	<u>Sign</u>
red-winged blackbird	raccoon-tracks
grackle	crayfish chimney
mourning dove	beaver-cuttings
mallard	
indigo bunting	
robin	
tree swallow	
red-sided garter snake	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse	X		
Succulents	X		

Comments: (den sites, successional trends, etc.) young forest succeeding to normal bottom land timber. This year its been frequently flooded

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

Location: #17 river ward of Indian Creek levee

Date: 6/3/82

Time: 1:45 pm

Habitat Type: stream border

Weather: cloud cover 80% - 64°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 50%

Dominant Species: cottonwood, willow, elm

Age Classes: variable - 3-15 inches

Understory:

Percent Cover: 50%

Dominant Species: elm, boxelder, grape

Ground Cover:

Percent Cover: 35%

Dominant Species: ryegrass, grape

Grass/Forb Ratio: 20/80

Wildlife

<u>Species</u>	<u>Sign</u>
turkey vulture	packet gopher
red-winged blackbird	
indigo bunting	
house wren	
fox squirrel	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) mixed succession going to bottomland, dominated by cottonwood + Elm. Still too young for many den sites or cavities but some older trees are present.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #18 riverward of Willow Creek leveeDate: 6/4/82Time: 8:50 amHabitat Type: stream border - grazing landWeather: rain, 55°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 0%Dominant Species: -Age Classes: -

Understory:

Percent Cover: 5%Dominant Species: oak, a few individuals

Ground Cover:

Percent Cover: 50%Dominant Species: grasses, thistle, clover, wild carrotGrass/Forb Ratio: 65/35

Wildlife

<u>Species</u>	<u>Sign</u>
red-winged blackbird	
mallards	
hill deer	
ring-billed gulls	
grackle	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast	X		
Browse	X		
Succulents	X		

Comments: (den sites, successional trends, etc.) Area recently flooded,
ground saturated, grazed with pioneer forbs just starting

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #19Date: 6/3/82Time: 3:45 pmHabitat Type: floodplain forestWeather: clear, 65°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 25%Dominant Species: oak, basswood, dead, some walnutAge Classes: variable 8-24 inches

Understory:

Percent Cover: 70%Dominant Species: sassafras, paw paw, elm, grape

Ground Cover:

Percent Cover: 75%Dominant Species: bel straw, poke weed, may apple, grapeGrass/Forb Ratio: 10/90

Wildlife

<u>Species</u>	<u>Sign</u>
cardinal	deer - tracks
blue jay	
catbird	
turkey vulture	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast		X	
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) there are a number of large dead trees available for den sites and cavity nesters. Succession at varied levels, appears that this woodland has been partially selectively cut.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

Location: #20

Date: 6/4/82

Time: 3:15 pm

Habitat Type: floodplain forest

Weather: cloudy- 67°

Investigator(s): DWS - GAP

Vegetative Cover

Overstory:

Crown Closure: 35%

Dominant Species: oak

Age Classes: DBH - 8" — 15"

Understory:

Percent Cover: 55%

Dominant Species: oak, grape, dogwood, walnut

Ground Cover:

Percent Cover: 80%

Dominant Species: Virginia creeper, poison ivy, raspberry, grape,
pokeweed

Grass/Forb Ratio: 10/90

Wildlife

<u>Species</u>	<u>Sign</u>
wood pewee	deer - tracks
red-headed woodpecker	eastern mole - runs
bluejay	
mourning dove	
tingbird	
indigo bunting	
cottontail	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast			X
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) Many medium sized oak trees, with a few dead trees, disturbed succession going to oak climax

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #21Date: 6/4/82Time: 3:30 pmHabitat Type: flood plain forestWeather: partly cloudy - 69°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 30%Dominant Species: oak, ashAge Classes: relatively young - 4-10 inches

Understory:

Percent Cover: 75%Dominant Species: sawtooth, dogwood, basswood

Ground Cover:

Percent Cover: 80%Dominant Species: Virginia creeper, raspberries, grapeGrass/Forb Ratio: 10/90

Wildlife

<u>Species</u>	<u>Sign</u>
American Toad	deer - tracks
bluejay	eastern mole - runs
grackle	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast		X	
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) Mostly younger oaks, not as much dead trees as other woodlots

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-44

Location: #22

Date: 6/4/82

Time: 12:20 pm

Habitat Type: floodplain forest

Weather: cloudy - 60°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 60%

Dominant Species: hackberry, walnut, black locust, oak

Age Classes: variable, mostly younger 6-24 inches

Understory:

Percent Cover: 30%

Dominant Species: sawgrass, hackberry, box elder, hickory

Ground Cover:

Percent Cover: 60%

Dominant Species: bedstraw, virginia creeper, chest grass

Grass/Forb Ratio: 15/85

Wildlife

<u>Species</u>	<u>Sign</u>
indigo bunting	deer - tracks
mocking bird	cooter mole - run
bern swallow	freshly dug fox or coyote den
y-b cuckoo	older den sight
grackle	
blue-gray gnatcatcher	
fox squirrel	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast		X	
Browse		X	
Succulents	X		

Comments: (den sites, successional trends, etc.) A few large dead trees used for cavity nests, disturbed wood lot currently succeeding back into maturity

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-46

Location: #23

Date: 6/4/82

Time: 1:20 pm

Habitat Type: floodplain forest

Weather: cloudy 64°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 20%

Dominant Species: sassafras, oak, black cherry

Age Classes: lots of large sassafras up to 16 inches DBH; mixed
large and young oaks and cherry

Understory:

Percent Cover: 50%

Dominant Species: Sassafras

Ground Cover:

Percent Cover: 70%

Dominant Species: bedstraw, virginia creeper, poke weed, raspberry,
grass sp.

Grass/Forb Ratio: 15/85 in most areas; some open areas within
the woods 85/15

Wildlife

<u>Species</u>	<u>Sign</u>
<u>mourning dove</u>	<u>deer - tracks</u>
<u>black-capped chickadee</u>	
<u>chimney swift</u>	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast		X	
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) Disturbed, cleared, areas found within woodlot dominated by grasses. Exceptionally large and numerous Sassafras trees present.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #24Date: 6/4/82Time: 2:00 pmHabitat Type: floodplain forestWeather: cloudy - 65°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 60%Dominant Species: ash, river birch, cottonwoodAge Classes: ash - 4 to 14 inches DBH, large cottonwood to 30 inches DBH;
birch ave. DBH 10 inches.

Understory:

Percent Cover: 20%Dominant Species: ash, elm

Ground Cover:

Percent Cover: 30%Dominant Species: poison ivy, virginia creeperGrass/Forb Ratio: 5/95

Wildlife

<u>Species</u>	<u>Sign</u>
red-winged blackbirds	crayfish chimney
rose-breasted grosbeak	
bobwhite	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse	X		
Succulents	X		

Comments: (den sites, successional trends, etc.) Wetland located on the east edge of this woodlot.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #25Date: 6/4/82Time: 2:35 pmHabitat Type: floodplain forestWeather: cloudy 66°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 40%Dominant Species: walnut, hackberry, black locustAge Classes: variable from 6 to 24 inches

Understory:

Percent Cover: 40%Dominant Species: sourasfras, boxwood, mulberry, elm

Ground Cover:

Percent Cover: 85%Dominant Species: virginia creeper, bedstraw, may appleGrass/Forb Ratio: 10/90

Wildlife

<u>Species</u>	<u>Sign</u>
king bird	fox squirrel - nests
yellow-billed cuckoo	deer - tracks
wood pewee	
great-created flycatcher	
red-headed wood pecker	
brown-headed cowbird	
fox squirrel	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		x	
Hard Mast		x	
Browse		x	
Succulents	x		

Comments: (den sites, successional trends, etc.) Portion formerly used as trash dump quite a few years ago. Ungrazed and in mixed succession with adequate dead trees present for cavitys

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-52

Location: #26

Date: 6/3/82

Time: 6:50 pm

Habitat Type: floodplain forest

Weather: clear - 61°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 25%

Dominant Species: oak, hackberry

Age Classes: variable range in DBH 4-14 inches

Understory:

Percent Cover: 75%

Dominant Species: grape, elm, poison ivy

Ground Cover:

Percent Cover: 90%

Dominant Species: wild cucumber, poison ivy, pokeweed

Grass/Forb Ratio: 5/95

Wildlife

<u>Species</u>	<u>Sign</u>
barn swallow	deer - tracks
rose-breasted grosbeak	
robin	
red-bellied wood pecker	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast	X		
Hard Mast		X	
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) Good number of dead trees mostly DBH 6 inches or smaller. Mixed successional stage, not currently grazed.

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORY

B-54

Location: #27

Date: 6/4/82

Time: 1:05 pm

Habitat Type: floodplain forest

Weather: cloudy 63°

Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 50%

Dominant Species: silver maple, cottonwood, willow

Age Classes: variable DBH 6-24 inches

Understory:

Percent Cover: 30%

Dominant Species: elm, silver maple, ash

Ground Cover:

Percent Cover: 10%

Dominant Species: grass sp.

Grass/Forb Ratio: 90/10

Wildlife

<u>Species</u>	<u>Sign</u>
red-winged blackbird	
bluejay	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast	X		
Browse	X		
Succulents	X		

Comments: (den sites, successional trends, etc.) Very moist soils, formerly flooded this spring

U.S. FISH AND WILDLIFE SERVICE
TERRESTRIAL RECONNAISSANCE INVENTORYLocation: #28Date: 6/4/82Time: 9:00 amHabitat Type: floodplain forestWeather: rain - 55°Investigator(s): DWS, GAP

Vegetative Cover

Overstory:

Crown Closure: 50%Dominant Species: mostly oak; walnut and basswood also presentAge Classes: large 10-30 inches DBH

Understory:

Percent Cover: 50%Dominant Species: walnut, hockberry, grape, elm

Ground Cover:

Percent Cover: 70%Dominant Species: virginia creeper, bedstrawGrass/Forb Ratio: 5/95

Wildlife

<u>Species</u>	<u>Sign</u>
American goldfinch	deer-tracks
cardinal	
red-winged blackbird	
yellow-billed cuckoo	
rose-breasted grosbeak	
mourning dove	
blue jay	
red-bellied woodpecker	
bobwhite	
yellow-shafted flicker	

AVAILABILITY OF WILDLIFE PREFERRED FOOD PLANTS

Type of Food	Availability		
	Scarce	Adequate	Abundant
Soft Mast		X	
Hard Mast			X
Browse		X	
Succulents		X	

Comments: (den sites, successional trends, etc.) Some dead trees for cavity nesting and den sites. Generally good diversity with large oaks and lots of understory

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEY

Location: #1 Indian Creek
Habitat type: Stream
Date: 6/14/82 Time: 12:00 pm
Weather: Clear
Investigator(s): DWS, GAP
Length: 200 feet
Low flow width: 65 feet
Acreage: _____
Average depth: 9 feet Depth range: maximum of 14 feet
Velocity: 0.66 ft/sec.
Water Color: Brown Water Clarity: 11" (Secchi disk)
Water level: slightly high
Instream cover: a few submerged logs and brush
Substrate: mud
Pool-riffle ratio: no riffles present
Length of pools: -
Sinuosity: none
Fishing intensity: some signs present - moderate
Bank cover:
Dominant species: silver maple and cottonwood
Percent cover: 50%
Percent shading: 60%

Muskrat seen

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #2 Indian CreekHabitat type: StreamDate: 6/14/82 Time: 4:00 pmWeather: 50% cloud coverInvestigator(s): DWS, GAPLength: 200 feetLow flow width: 63 feet

Acreage: _____

Average depth: 28" inches Depth range: 0 to 30 inchesVelocity: 2.1 ft/sec.Water Color: Brown Water Clarity: 8.75 inchesWater level: slightly highInstream cover: a few submerged logsSubstrate: SandPool-riffle ratio: noneLength of pools: —Sinuosity: moderateFishing intensity: none

Bank cover:

Dominant species: willow, silver maplePercent cover: 90% above high water markPercent shading: 5%

raccoon, deer and squirrel tracks noted

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #3 Indian CreekHabitat type: StreamDate: 6/14/82 Time: 4:45 pmWeather: cloudyInvestigator(s): DWS, GMPLength: 200 feetLow flow width: 38 ft.

Acreage: _____

Average depth: 23 inches Depth range: 0-25 inchesVelocity: 2.7 ft./sec.Water Color: brown Water Clarity: 7.5 inchesWater level: slightly highInstream cover: very littleSubstrate: sandPool-riffle ratio: no rifflesLength of pools: -Sinuosity: slightFishing intensity: slight

Bank cover:

Dominant species: willow, dogwood, silver maple, cottonwood, Equisetum,
ragweed + grassesPercent cover: 90% above high waterPercent shading: 10%

numerous raccoon tracks

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #4 Willow CreekHabitat type: streamDate: 6/15/82Time: 2:30 pmWeather: rainInvestigator(s): DWS, GAPLength: 200 ft.Low flow width: 25 feetAcreage: -Average depth: 6 feetDepth range: 0 to 8 feetVelocity: 0.21 ft/sec.Water Color: brownWater Clarity: 11 inchesWater level: highInstream cover: plentiful, logs and brushSubstrate: rockPool-riffle ratio: noneLength of pools: -Sinuosity: noneFishing intensity: moderate, fishermen observed

Bank cover:

Dominant species: silver maple, smartweed, grapePercent cover: 50%Percent shading: 80%

numerous crayfish chimneys noted

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEY

Location: #5 Willow Creek

Habitat type: Stream

Date: 6/15/82 Time: 3:00 pm

Weather: rain

Investigator(s): DWS, GAP

Length: 200 feet

Low flow width: 15 feet

Acreage: -

Average depth: 4 inches Depth range: 0-14 inches

Velocity: 0.53 ft/sec.

Water Color: brown Water Clarity: 8 inches

Water level: slightly high

Instream cover: minimal

Substrate: mud

Pool-riffle ratio: none

Length of pools: -

Sinuosity: bends present, but channelized

Fishing intensity: none

Bank cover:

Dominant species: Sedges, Smartweed, Bidens, teal grass

Percent cover: 25%

Percent shading: 0%

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEY

Location: #6 Willow Creek
Habitat type: Stream
Date: 6/16/92 Time: 8:15 am
Weather: cloudy, 58°F
Investigator(s): DWS, GAP
Length: 200 ft.
Low flow width: 5 feet
Acreage: _____
Average depth: 10 inches Depth range: 0 to 17 inches
Velocity: 1.4 ft./sec.
Water Color: clear Water Clarity: clear to bottom
Water level: normal
Instream cover: some brush, algae present
Substrate: sand, small gravel
Pool-riffle ratio: 2-2
Length of pools: 30 feet : continuous
Sinuosity: none
Fishing intensity: none
Bank cover:
Dominant species: grasses, willow
Percent cover: 95%
Percent shading: 35%

Spring peeper observed

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #7 Ditch 1Habitat type: DitchDate: 6/15/92 Time: 11:00 amWeather: partly cloudyInvestigator(s): DWS, GAPLength: 200 feetLow flow width: 15 feetAcreage: Average depth: 15 inches Depth range: 0-18 inchesVelocity: 1.1 feet/sec.Water Color: brown Water Clarity: 12 inchesWater level: low flow normalInstream cover: some brush but minimalSubstrate: mud - 35%; sand 65%Pool-riffle ratio: noneLength of pools: -Sinuosity: minorFishing intensity: none

Bank cover:

Dominant species: Barnyard grass, Equisetum, duck potato, cattail, round-stem
bulrush, smartweed, milkweedPercent cover: 95%Percent shading: 2%crawfish chimneys, Natrix sp, deer

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #8 Ditch #1Habitat type: DitchDate: 6/15/82Time: 11:45 amWeather: cloudyInvestigator(s): DWS, GAPLength: 200 ft.Low flow width: 12 feetAcreage: -Average depth: 10 inchesDepth range: 0-14 inchesVelocity: 2.31 ft/sec.Water Color: brownWater Clarity: 5 inchesWater level: low flowInstream cover: minimal - some sticksSubstrate: mud and sandPool-riffle ratio: noneLength of pools: -Sinuosity: noneFishing intensity: none

Bank cover:

Dominant species: Equisetum, sumac, wild carrot, sedges, poison ivy,
smart weedPercent cover: 70% above high water markPercent shading: 1%

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #9 Ditch 1Habitat type: ditchDate: 6/15/82 Time: 12:30 pm.Weather: cloudyInvestigator(s): DWS, GAPLength: 200 feetLow flow width: 25 feetAcreage: -Average depth: 20 inches Depth range: 0-24 inchesVelocity: negligibleWater Color: brown Water Clarity: 10 inchesWater level: slightly highInstream cover: minimal - a few sticksSubstrate: 90% sand; 10% mudPool-riffle ratio: noneLength of pools: -Sinuosity: large bend at this locationFishing intensity: none

Bank cover:

Dominant species: mullen, barnyard grass, grape, raspberry, sumac,
dock, smartweed, trumpet flowerPercent cover: 70%Percent shading: 1%Great horned owl, Rana sp., a number of unidentified turtles

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #10 ditch 2Habitat type: ditchDate: 6/15/82 Time: 4:15 pmWeather: cloudyInvestigator(s): DWS, GAPLength: 200 feetLow flow width: 10 feet

Acreage: _____

Average depth: 5 inches Depth range: 0-6 inchesVelocity: minimalWater Color: clear Water Clarity: _____Water level: low flowInstream cover: cattails, pickerel weedSubstrate: mudPool-riffle ratio: noneLength of pools: —Sinuosity: noneFishing intensity: none

Bank cover:

Dominant species: cattail, pickerel weed, sedges, smartweed, willow,
4-Square stem unknown.Percent cover: 90%Percent shading: 90% from aquatic emergent vegetation

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #11 Ditch 2Habitat type: ditchDate: 6/15/82 Time: 5:10 pmWeather: cloudyInvestigator(s): DWS, GAPLength: 200 feetLow flow width: 25 feet

Acreage: _____

Average depth: 15 inches Depth range: 0-18 inchesVelocity: 0.4 ft/sec.Water Color: brown Water Clarity: 13 inchesWater level: Slightly highInstream cover: some brush and logs, bonyard grass. coveredSubstrate: mud and detritusPool-riffle ratio: noneLength of pools: -Sinuosity: noneFishing intensity: moderate

Bank cover:

Dominant species: dogwood, sumac, grasses, smartweed, raspberriesPercent cover: 80%Percent shading: 5%Cock pheasant, Rana sp

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEY

Location: #12 ditch 2
Habitat type: ditch
Date: 6/15/82 Time: 5:30 pm
Weather: cloudy
Investigator(s): DWS ; GAP
Length: 200 feet
Low flow width: 18 feet
Acreage: _____
Average depth: 9 inches Depth range: 0-18 inches
Velocity: 0.33 ft./sec.
Water Color: brown Water Clarity: 12 inches
Water level: low flow, normal
Instream cover: excellent, brush and logs
Substrate: sand
Pool-riffle ratio: none
Length of pools: -
Sinuosity: moderate
Fishing intensity: moderate
Bank cover:
Dominant species: grasses, raspberries, Sumac, smartweed, poison ivy,
grape, dogwood, sedges
Percent cover: 80%
Percent shading: 5%
green heron seen

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #13 Pankey Pond ditchHabitat type: ditchDate: 6/15/82 Time: 10:20 amWeather: cloudy 80°Investigator(s): DWS, GAPLength: 200 feetLow flow width: 18 feetAcreage: Average depth: 12 inches Depth range: 0-15 inchesVelocity: 0.37 ft/sec.Water Color: brown Water Clarity: 8.25 inchesWater level: slightly highInstream cover: minimal - some brushSubstrate: mudPool-riffle ratio: noneLength of pools: -Sinuosity: noneFishing intensity: slight

Bank cover:

Dominant species: dogwood, poison ivy, grasses, grape, smartweedPercent cover: 80%Percent shading: 10%

cragfish chimneys

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #14 Ponkey Pond ditchHabitat type: ditchDate: 6/15/82Time: 8:45 amWeather: cloudy, 77°Investigator(s): DWS, GAPLength: 200 feetLow flow width: 20 feetAcreage: -Average depth: 9 inchesDepth range: 0-13 inchesVelocity: 0.57 ft/secWater Color: clear-brownish tintWater Clarity: clear to bottomWater level: low flow normalInstream cover: logs and brush throughoutSubstrate: mudPool-riffle ratio: noneLength of pools: -Sinuosity: noneFishing intensity: none

Bank cover:

Dominant species: grape, dogwood, elm, virginia creeper, mulberryPercent cover: 85%Percent shading: 70%

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #15 Ponkey Pond ditchHabitat type: ditchDate: 6/15/82 Time: 9:45 amWeather: cloudy, 80°Investigator(s): DWS, GAPLength: 200 feetLow flow width: 35 feetAcreage: Average depth: 12 inches Depth range: 0-18 inchesVelocity: 0.23 ft/sec.Water Color: gray-brown Water Clarity: clear to bottomWater level: slightly highInstream cover: some brush, sedges, cattails, algaeSubstrate: mudPool-riffle ratio: noneLength of pools: -Sinuosity: noneFishing intensity: none

Bank cover:

Dominant species: dogwood, mulberry, sumac, sedges, grasses, cattails,
smartweedPercent cover: 95%Percent shading: 10%carp seen in water, Rana sp, crayfish chimneys

U.S. FISH AND WILDLIFE SERVICE
AQUATIC RECONNAISSANCE SURVEYLocation: #16Habitat type: lateral ditch wetlandDate: 6/15/82 Time: 6:00 pmWeather: cloudyInvestigator(s): DWS, GAPLength: 200 feetLow flow width: 18 feetAcreage: -Average depth: 4 inches Depth range: 0-6 inchesVelocity: noneWater Color: clear Water Clarity: clear to bottomWater level: normalInstream cover: river bulrush, sedges, pickerelweedSubstrate: mudPool-riffle ratio: noneLength of pools: -Sinuosity: noneFishing intensity: none

Bank cover:

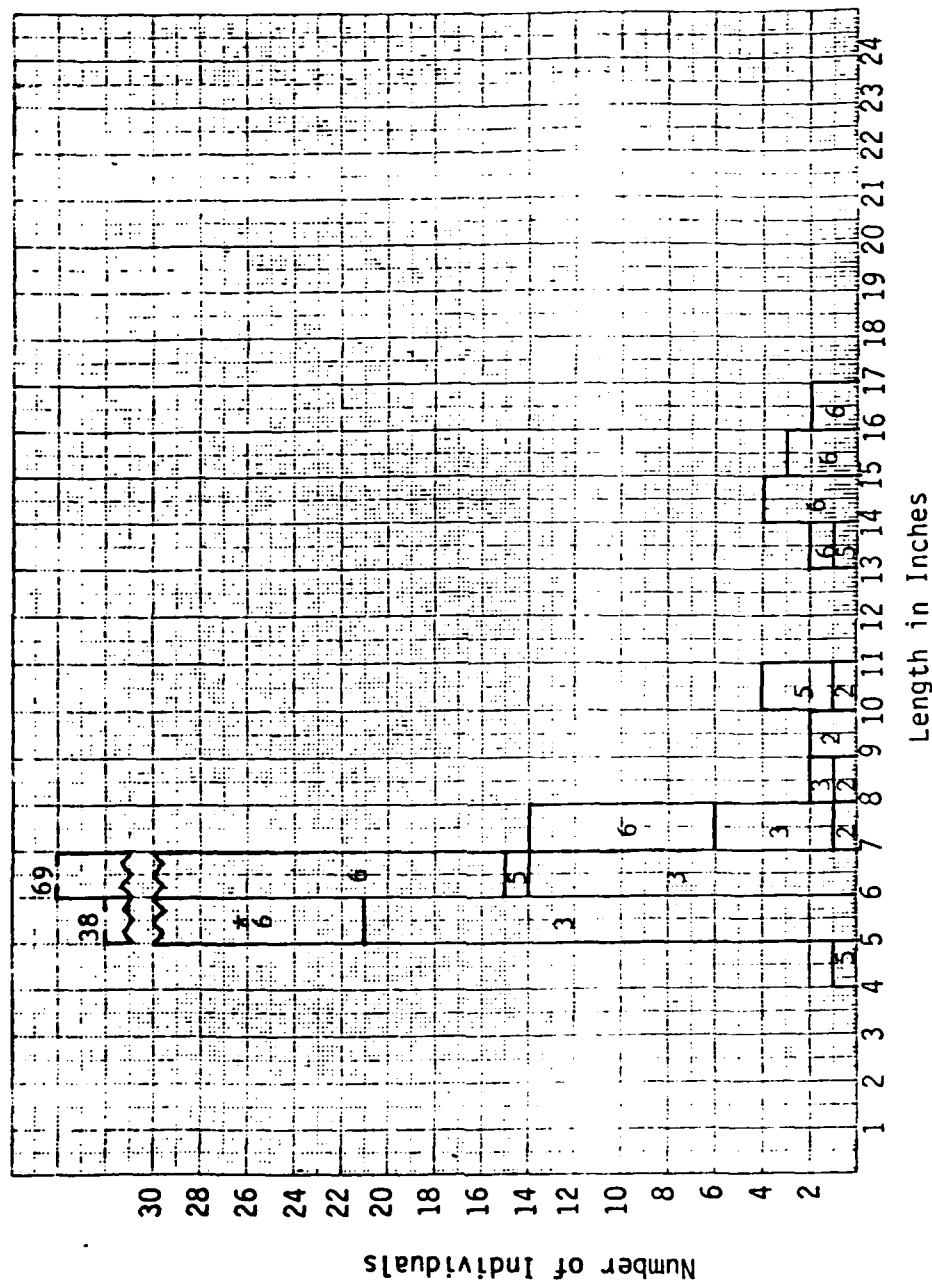
Dominant species: River bulrush, sedges, pickerelweed, smartweedPercent cover: 100%Percent shading: 75% from emergent vegetation, large woodlot borders west edge.

crayfish chimneys, nesting mallards

APPENDIX C

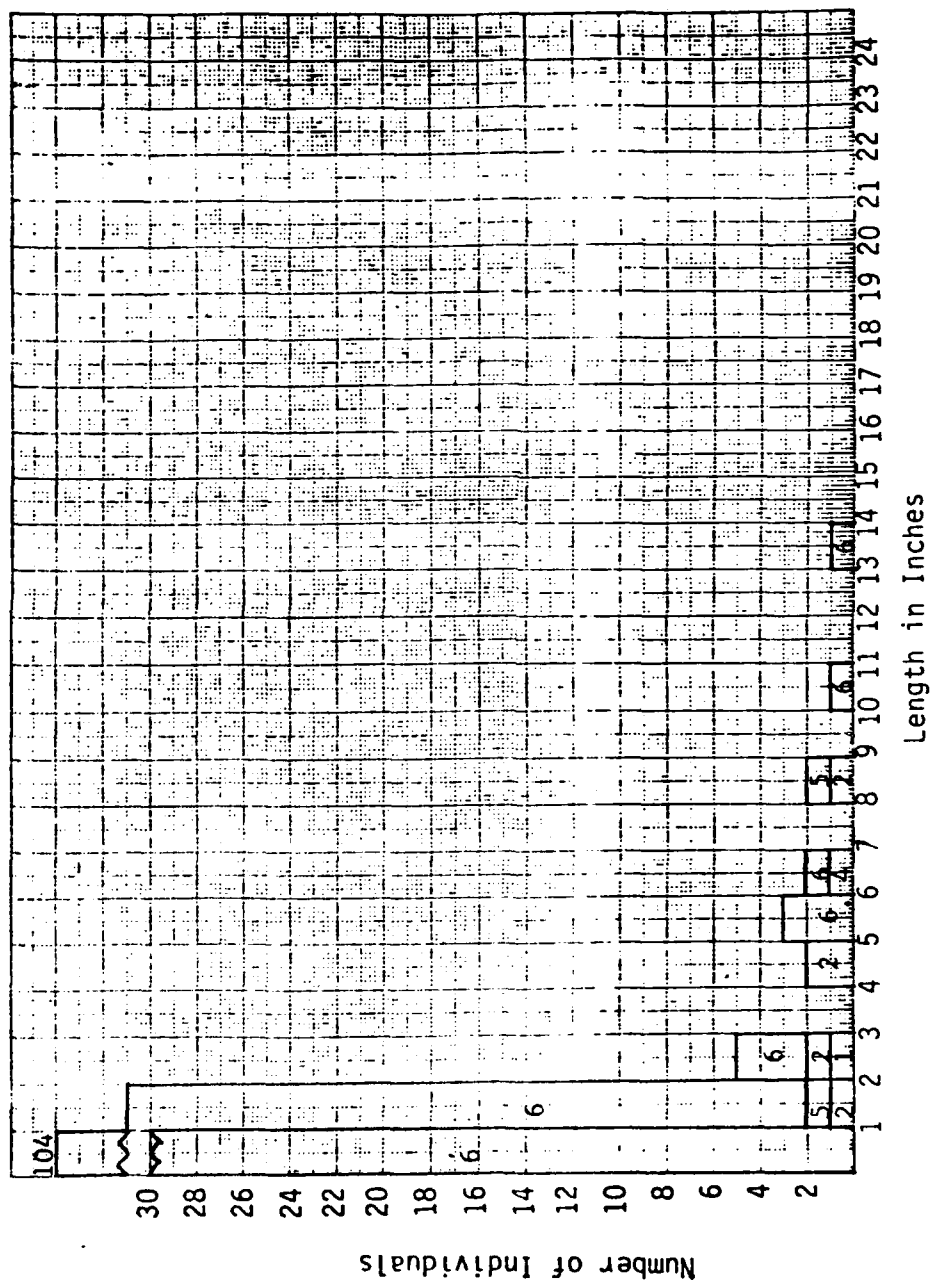
Length and Weight Distribution Graphs for Carp, Bigmouth Buffalo,
Yellow Bullhead, Largemouth Bass, Green Sunfish, Bluegill,
Green Sunfish x Bluegill and Black Crappie Collected at Six Aquatic
Sampling Stations in Meredosia Lake and Willow Creek Drainage and
Levee District.

Carp

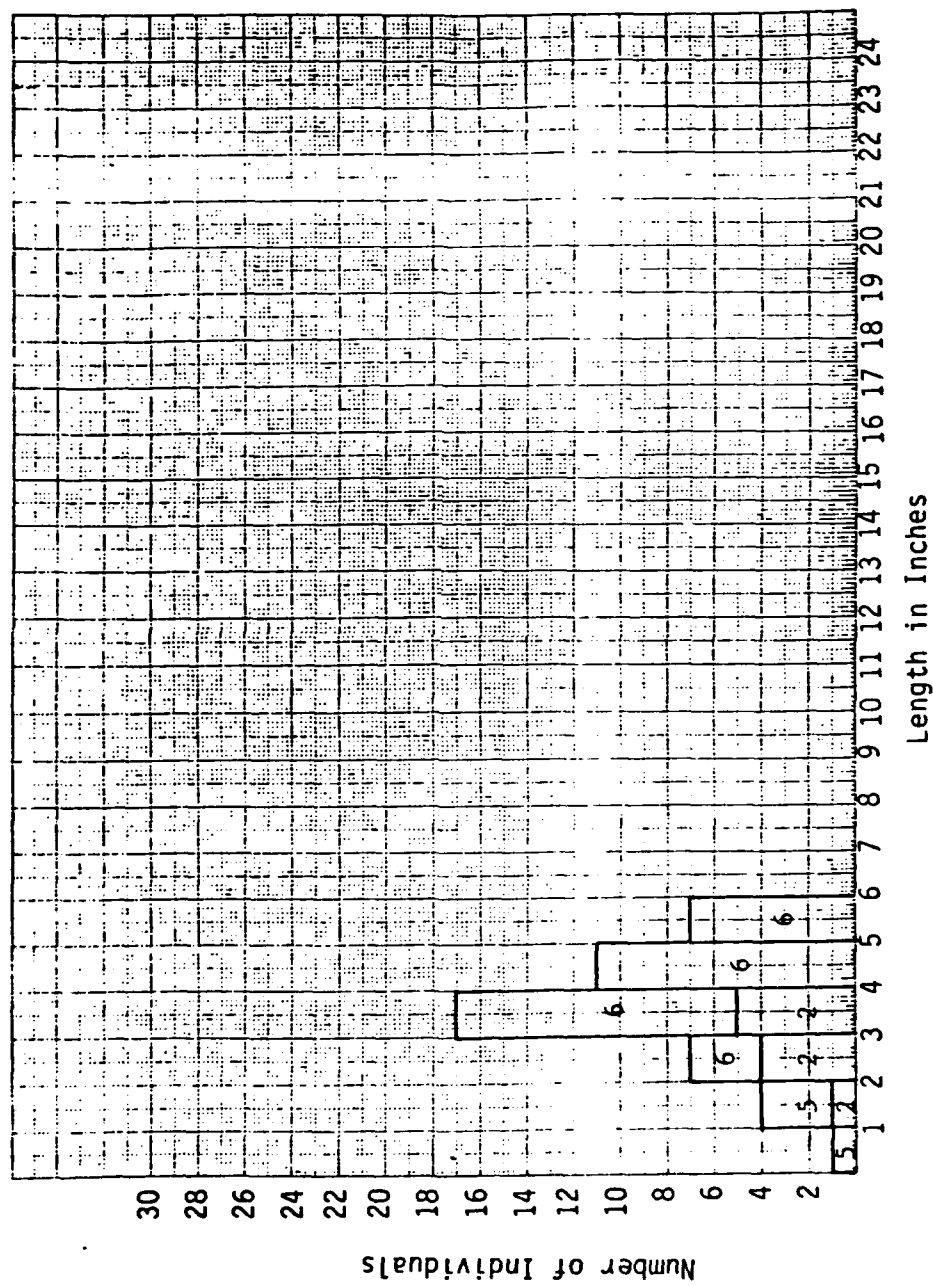


* Aquatic Sampling Station Number

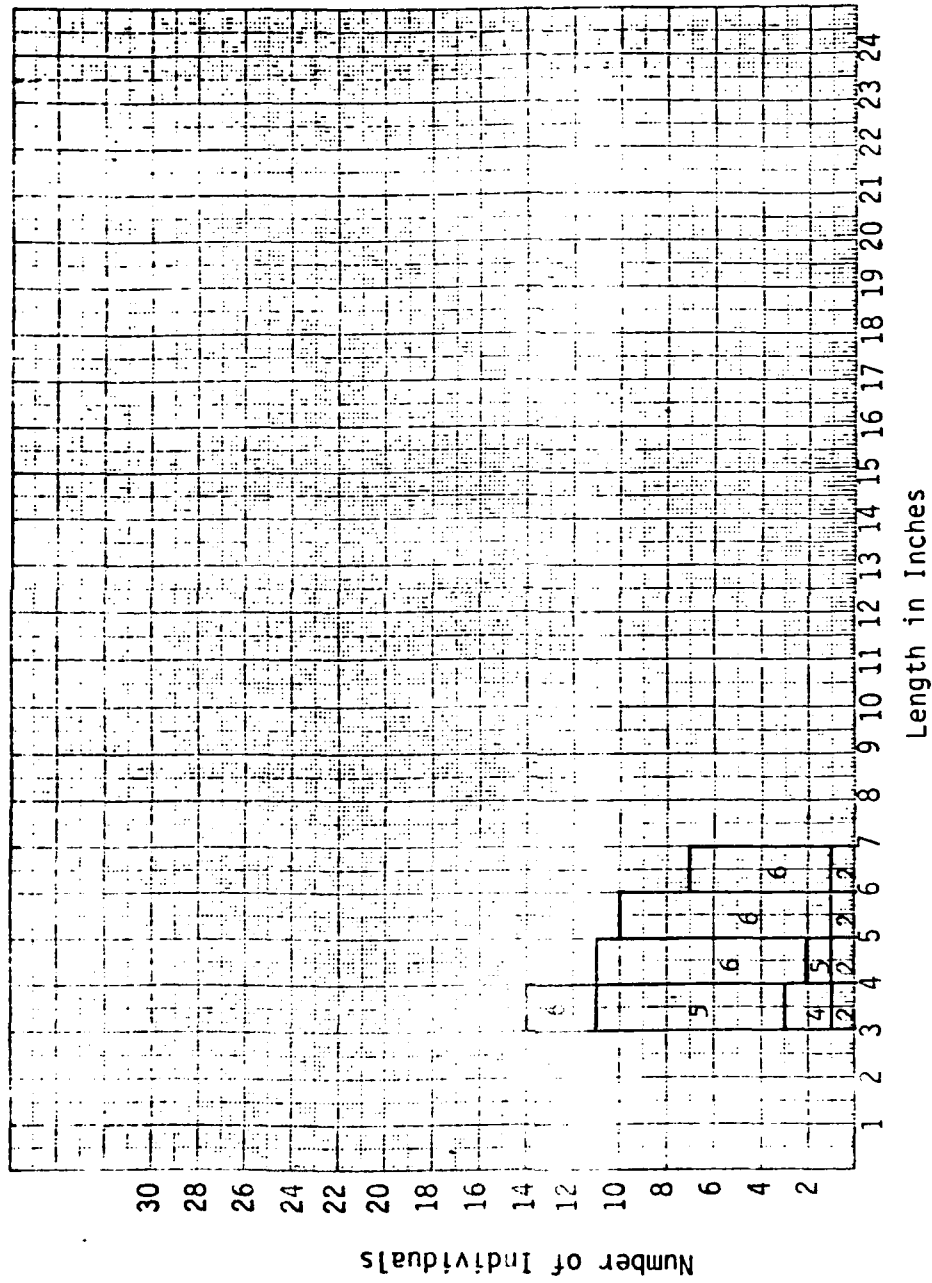
Largemouth Bass



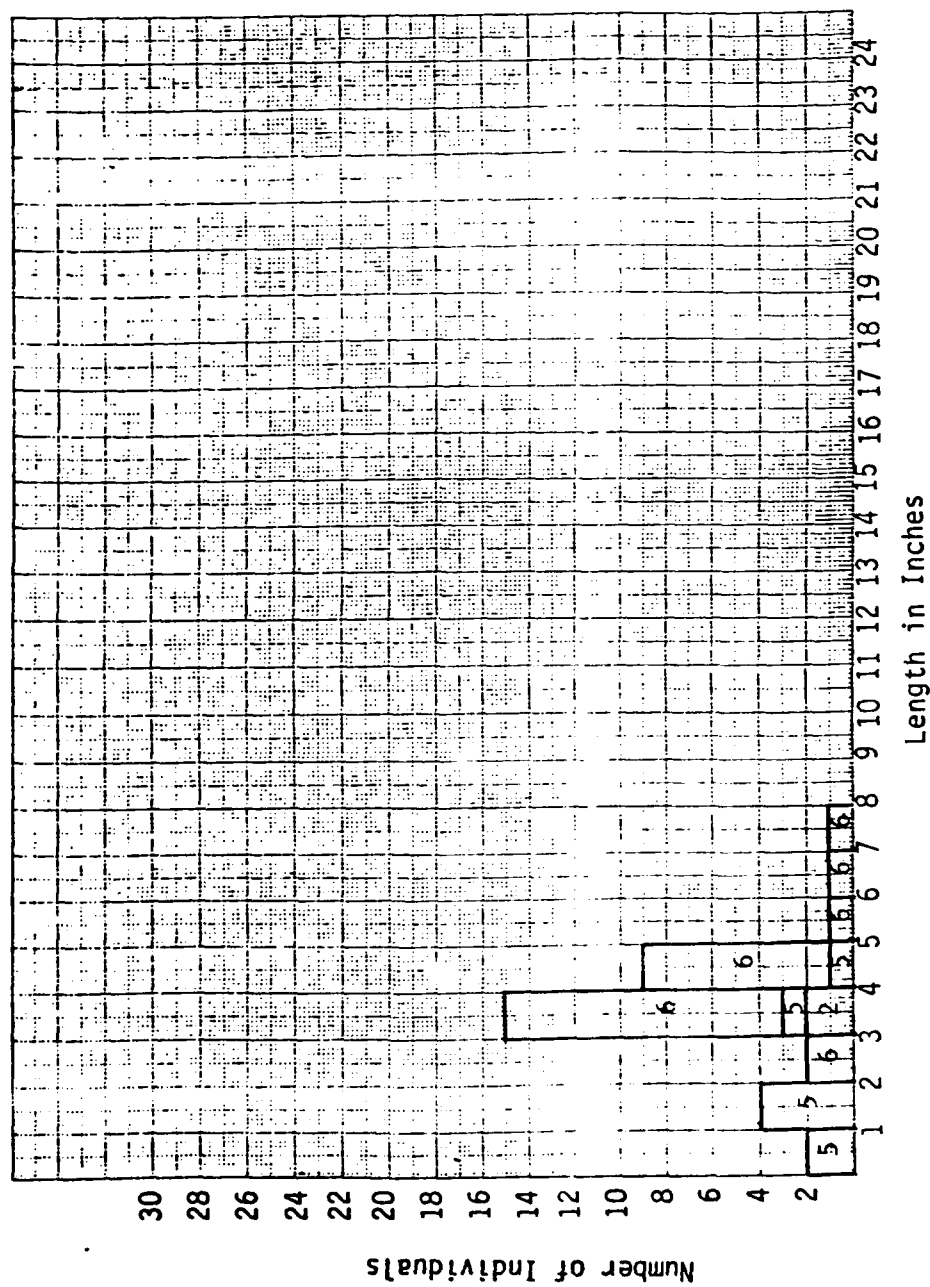
Green Sunfish

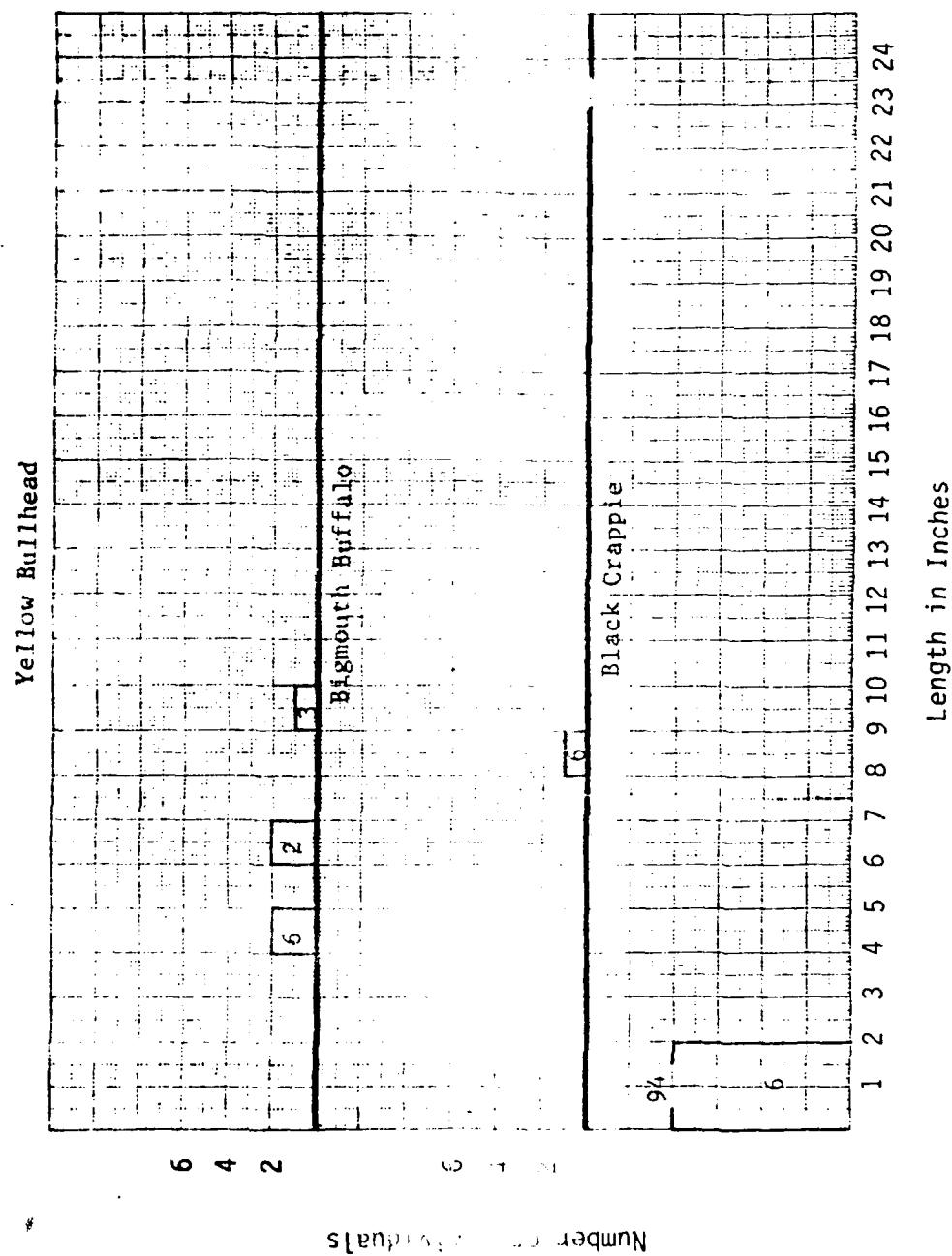


Bluegill

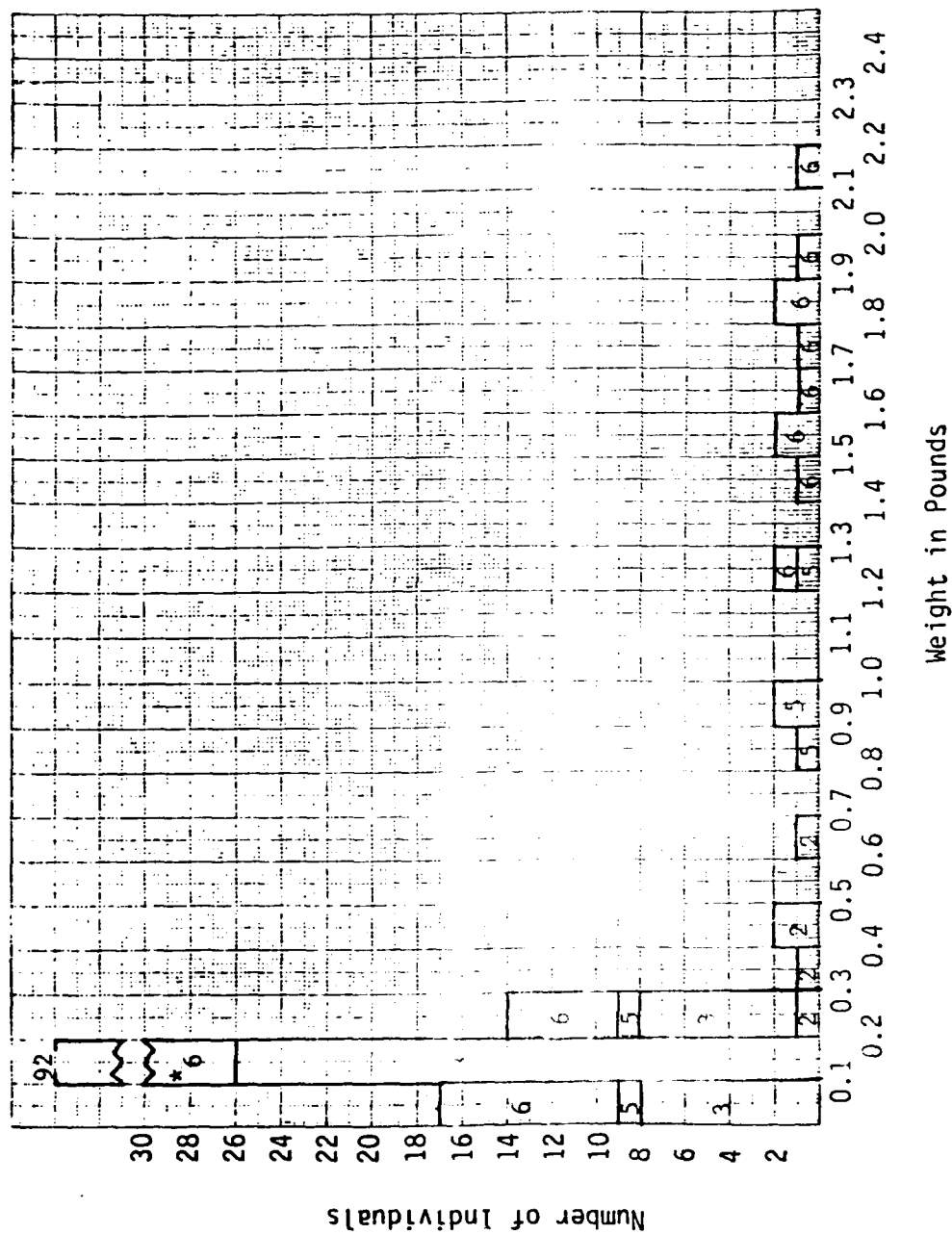


Green Sunfish x Bluegill



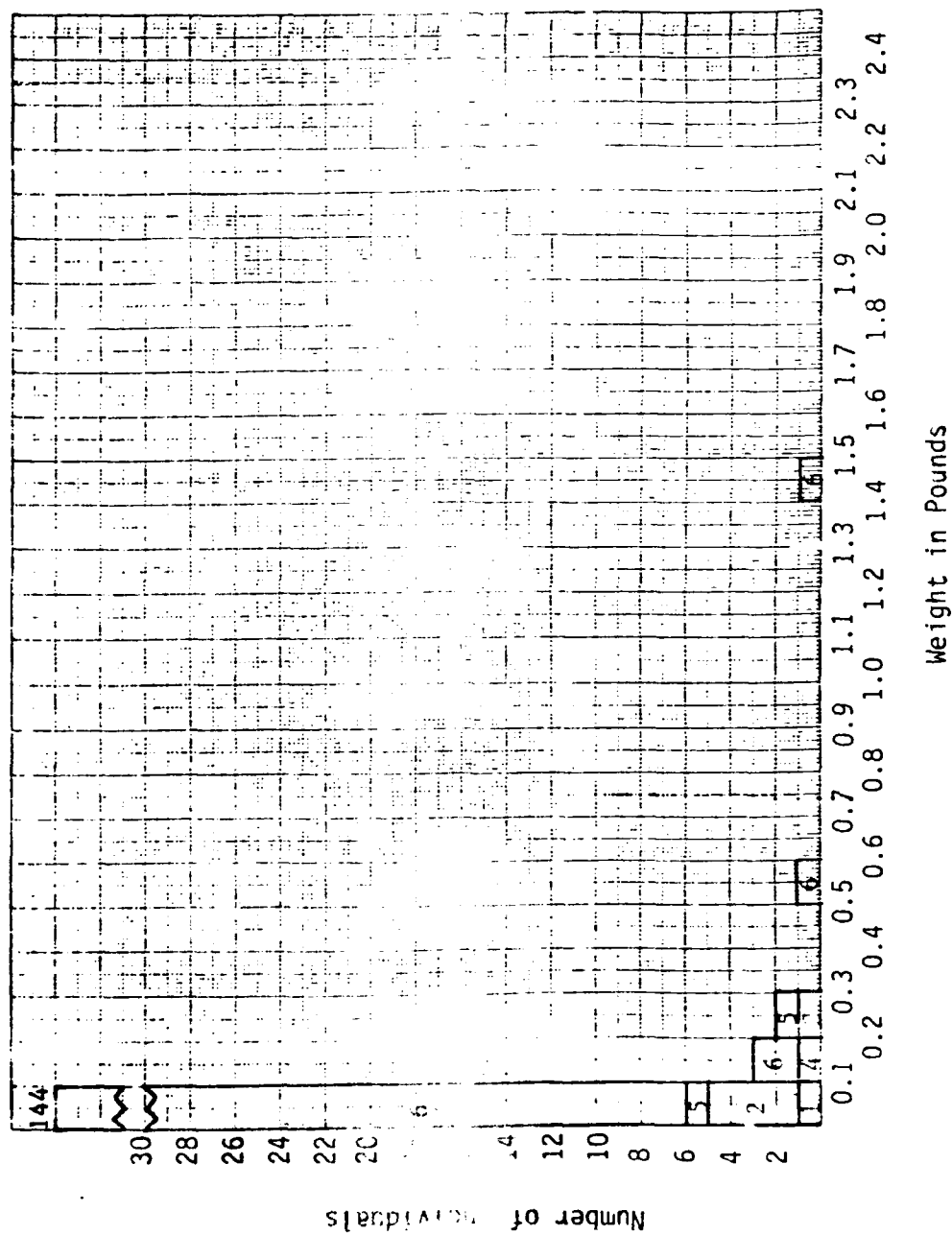


Carp

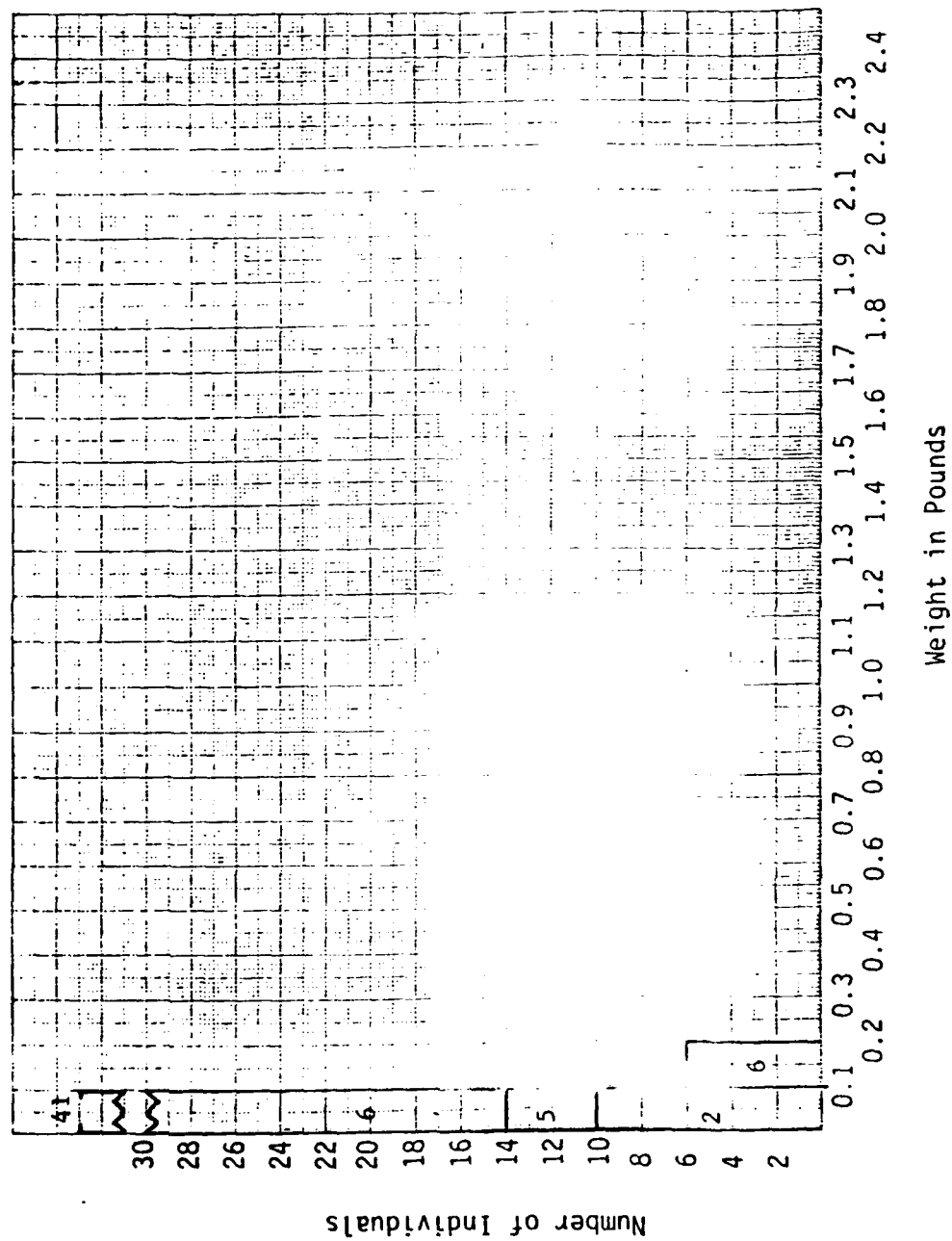


* Aquatic Sampling Station Number

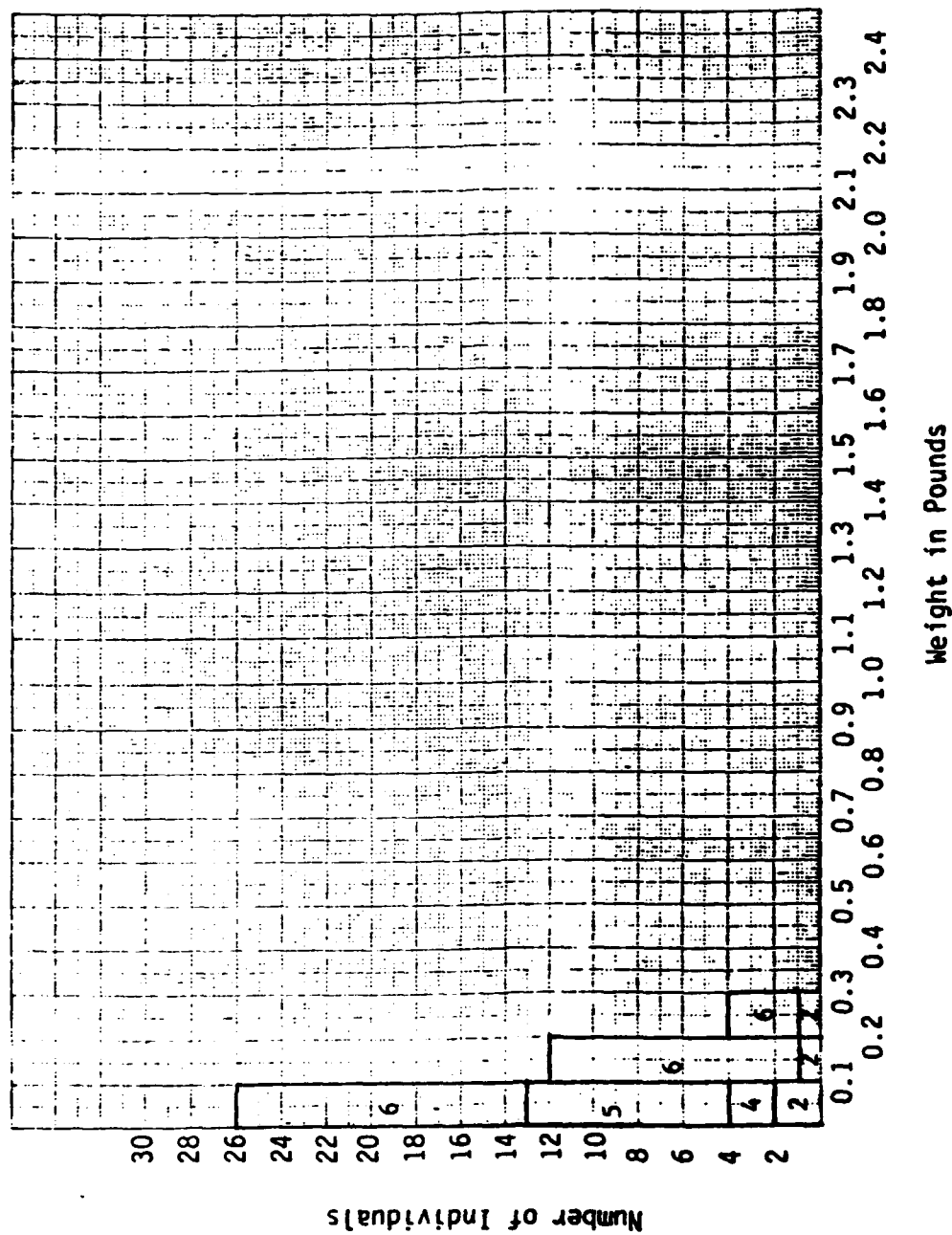
Largemouth Bass



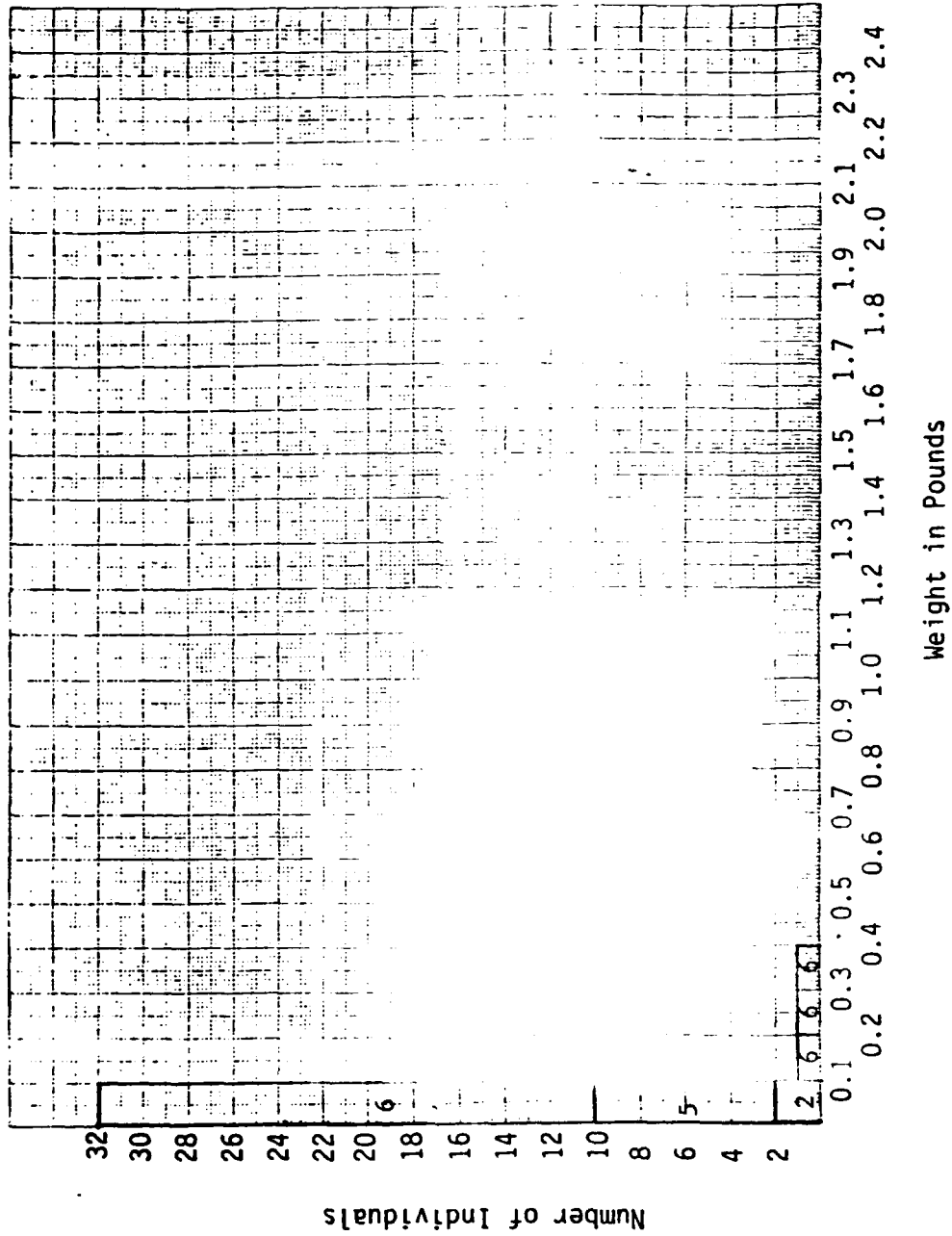
Green Sunfish



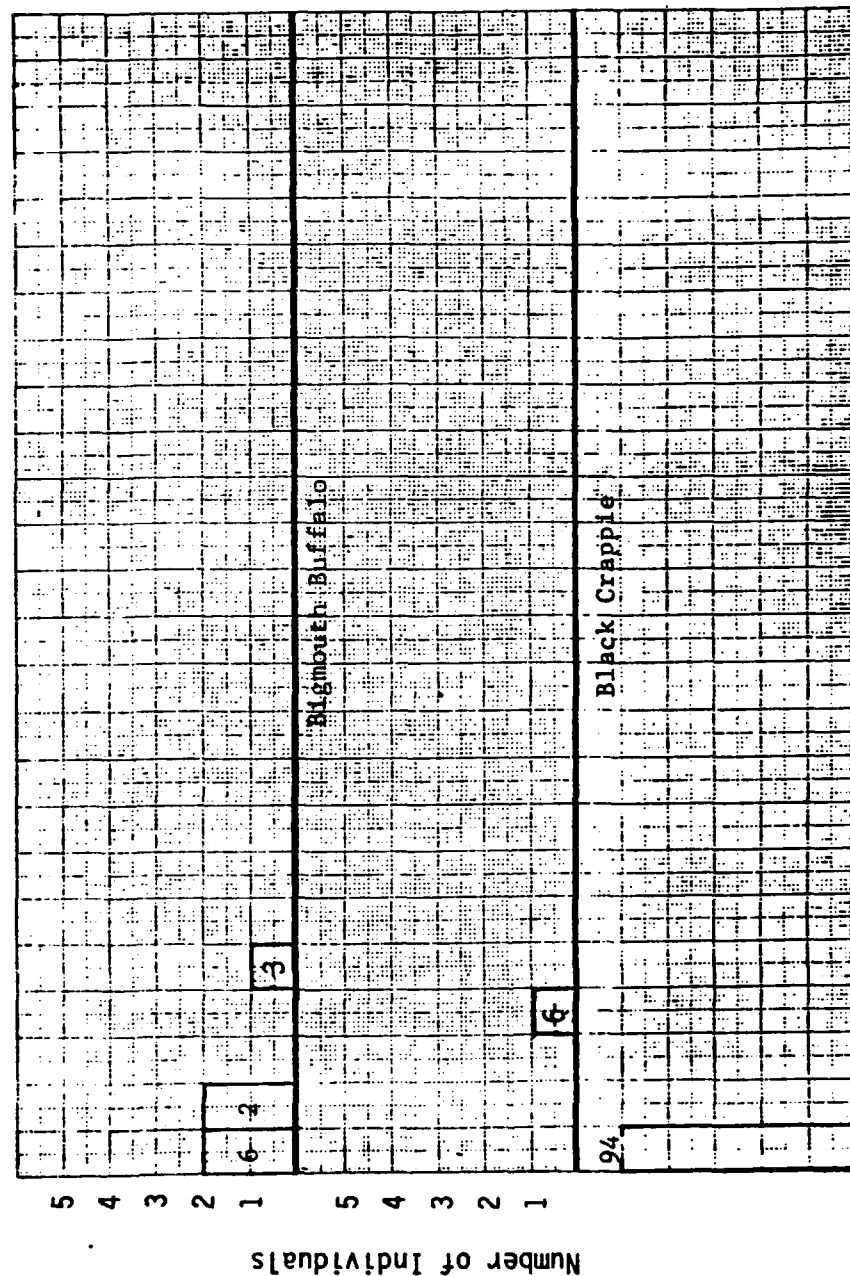
Bluegill



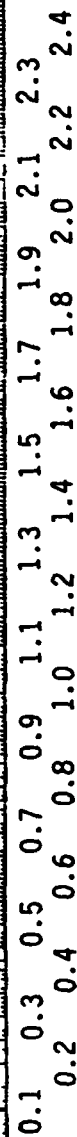
Green Sunfish x Bluegill



Yellow Bullhead



Black Crappie



Weight in Pounds

APPENDIX D

**Fishermen User Day Analysis for Cass and Morgan Counties
in the Meredosia Lake and Willow Creek Drainage and Levee District.**

Fisherman User Day Analysis

A fisherman user day analysis was conducted for the study area. The analysis is based on Rogers (1980). Fisherman license sales information (Table D-1) for Cass and Morgan counties was obtained from Jim Oliver and Hal Davis of the License and Regi-Title Section of the Illinois Department of Conservation.

The user day analysis is based on a number of assumptions. The first assumption is that the aquatic systems within the study area are limited to habitat types and secondly that not all of a given habitat type will support recreational fishing. These assumptions apply in the study area. Only the lower 0.68 miles, or 2.5 acres, of Willow Creek will support recreational fishing because the upper end is too shallow. Major portions of Ditch 1, Ditch 2 and Pankey Pond Ditch may support a recreational fishery; however, the lateral ditches were either too shallow or intermittent and thereby disqualified from analysis. All 23 acres of Indian Creek adjacent to the District were considered fishable.

The third assumption is that the sport fishing resources of the study area are limited and therefore will not attract fishermen other than local residents. Hence, only fishermen from Cass and Morgan counties will utilize the existing fishing opportunities. Rogers estimated that 45.3 percent of the fishermen in Illinois are unlicensed. Thus, using the ten-year average from Table D-1, the total number of fishermen (Table D-2) were calculated by adding the licensed and estimated unlicensed fishermen for each county.

TABLE D-1. Total Fishing License Sales for Cass and Morgan Counties from 1971 through 1980.

Year	Cass County License Sales	Morgan County License Sales
1971	2,405	4,896
1972	2,371	2,632
1973	2,292	4,516
1974	3,370	4,658
1975	2,524	4,534
1976	2,668	4,527
1977	2,559	4,426
1978	2,565	3,444
1979	1,780	2,518
1980	2,092	2,884
Ten Year Average:	2,463	3,904

TABLE D-2. Fisherman User Day Analysis for Meredosia Lake and Willow Creek Drainage and Levee District, Cass and Morgan Counties, Illinois.

	<u>Cass County</u>	<u>Morgan County</u>
Fishable habitat in study area (acres)	34.0	7.0
Small streams in county (acres)	82.0 ¹	285.3 ²
Total Fishermen	4507	7144
Total Fishermen Days/Year	112,675	178,600
Total Fishermen Days/Year/Acre	1374.1	626.0
Actual Total Fishermen Days/Year/Acre Using 8.1% Correction Factor	111.3	50.7
Dollar Value for Study Area	\$9,460.50	\$887.25

1 - From Rogers 1971.

2 - From Rogers 1970.

Rogers found that the average number of annual fishing trips was 25. By assuming this to be true on the study area, the total fisherman days per year were obtained by multiplying the total fishermen by 25. Dividing this number by the acres of similar habitat type in the county gave us the total/fisherman days per year per acre. Rogers assumed that not all the time spent fishing was in only a single habitat type. He determined the percent of time each fisherman spent in each habitat type on a regional basis. For the study area it is assumed that resident fishermen actually spent 8.1 percent of time fishing small streams, therefore, a correction factor of 0.081 was used to determine actual fisherman days per year per acre.

The last assumption is that the dollar value of recreational fishing is \$2.50 per fisherman day. By multiplying the actual fisherman days per year per acre by the acres of habitat in the study area and multiplying this product by \$2.50 the monetary value of fishing the study area was determined (Table D-2). For Cass County, a dollar value of \$9,460.50 was calculated and for Morgan County the figure is \$887.25, for a total of \$10,347.75 on the study area.

The 1975 National Survey of Hunting, Fishing and Wildlife Associated Recreation prepared by the U.S. Fish and Wildlife Service, determined that warmwater fishermen spent about \$9.00 per fishing day. The final dollar

figures derived using \$2.50 per day for this analysis are, therefore, probably conservative and should, at least, be updated to take into account inflation.

Although this user-day analysis may give a general idea of the recreational fishing use on the study area, the data should be somewhat qualified. This method was devised by the IDOC to develop "information about Illinois anglers on a statewide and regional basis". The employment of this procedure to determine user-day information for a specific site may be overburdening this methodology and conclusions based on these data should be critically reviewed.

APPENDIX E

**Summaries of Interviews and Telephone Conversation Records
With Specialists and Persons Familiar With the Project Area.**

CONTACT REPORT

Person Completing Report: Don Steffeck
Date of Contact: June 16, 1982
Type of Contact: Interview
Person Contacted: Dr. Frank Bellrose
Principal Scientist
Illinois Natural History Survey
River Research Lab
Box 599
Havana, Illinois 62644
Phone: 309/543-3950

Summary of Discussion:

Dr. Bellrose determined that the Levee Districts were initially formed separately, Willow Creek in 1893 and Meredosia Lake in 1904 and that they have rarely been in danger of being overtopped. The references he used were Mulvihill and Cornish, 1929, and Illinois Department of Conservation, 1950. Dr. Bellrose stated that most of the woodlots in the District are dominated by black oak and that if the woodlots were near a water source, such as a stream or ditch, they could be used by wood ducks. He said the wood duck populations are currently in a depressed condition. The agricultural fields in the District are used by waterfowl during fall and spring migration but fall plowing significantly reduces their value. He stated that if the levees are raised, the use of borrow areas landward of the existing levee could be designed to be advantageous for fish and wildlife.

CONTACT REPORT

Person Completing Report: Don Steffeck
Date of Contact: July 26, 1982
Type of Contact: Telephone
Person Contacted: Dr. Frank Kulfinski
Professor of Botany
Southern Illinois University-Edwardsville
Dept. of Biological Sciences
SIU-E
Edwardsville, Illinois
Phone: 618/692-2728

Summary of Discussion:

Dr. Kulfinski said that he had no firsthand knowledge of the resources present specifically on the District.

CONTACT REPORT

Person Completing Report: Don Steffeck
Date of Contact: July 27, 1982
Type of Contact: Telephone
Person Contacted: Mr. Dick Lutz
Head, Impact Analysis Section
Illinois Department of Conservation
603 Wm. G. Stratton Building
Springfield, Illinois 62706
Phone: 217/782-3884

Summary of Discussion:

Mr. Lutz said that he was unaware of any fish or wildlife information specifically for the District. He suggested reviewing the county water resources reports, the Preno and Labisky 1971 harvest data, and the Illinois Department of Conservation Endangered Species, Natural Areas and Nature Preserves publications. He said that the district biologists might have more specific information.

CONTACT REPORT

Person Completing Report: Don Steffeck
Date of Contact: June 16, 1982
Type of Contact: Interview
Person Contacted: Dr. Richard Sparks
Professional Scientist
Illinois Natural History Survey
River Research Lab
Box 599
Havana, Illinois 62644
Phone: 309/543-3950

Summary of Discussion:

Dr. Sparks stated that he had little knowledge of the aquatic resources specifically for Meredosia Lake and Willow Creek Drainage and Levee District. He said that there were reports prepared by the Natural History and Water Surveys for Lake Meredosia. In addition, there is a deep area located near the levee that is a good refuge area for fish and provides good fishing opportunities. Related to this he said that if borrow areas are needed to increase the size of the levee, a borrow area from Lake Meredosia may be an alternative worth considering. He said the silt may be disposed of over the farm fields within the District and use the sand as borrow material for the levee. Otherwise he suggested using borrow sites landward of the levee and design these areas for fish and wildlife resources.

CONTACT REPORT

Person Completing Report: Don Steffek
Date of Contact: August 10, 1982
Type of Contact: Telephone
Person Contacted: Dr. J. Thomerson
Professor of Zoology
Southern Illinois University-Edwardsville
Department of Biological Sciences
SIU-E
Edwardsville, Illinois
Phone: 618/692-3368
(Also affiliated with St. Louis District-COE.)

Summary of Discussion:

Dr. Thomerson stated that he was not very familiar with the specific study area and was not aware of any publications other than those readily available in the literature.

CONTACT REPORT

Person Completing Report: Don Steffeck
Date of Contact: June 21, 1982
Type of Contact: Telephone
Person Contacted: Mr. Thomas Sanford
Refuge Manager
U.S. Fish and Wildlife Service
Chautauqua National Wildlife Refuge
Rural Route 2
Havana, Illinois 62644
Phone: 309/535-2290

Summary of Discussion:

Mr. Sanford stated that his main area of knowledge is of Meredosia Refuge proper, which is located just west of the study area. He said he would send us a map of the refuge and part of a wildlife report recently prepared for the refuge. The report contains tables with lists of wildlife seen on the refuge.

CONTACT REPORT

Person Completing Report: Don Steffeck
Date of Contact: June 18, 1982
Type of Contact: Telephone
Person Contacted: Mr. Michael Sweet
Endangered Species Program Coordinator
Illinois Department of Conservation
600 North Grand Avenue-West
Springfield, Illinois 62706
Phone: 217/785-8774

Summary of Discussion:

Mr. Sweet, the endangered species biologist for the Illinois Department of Conservation, said he had little first hand knowledge of the project area. However, he said that the Illinois mud turtle should be included in the list and it may not be on the standard published county list.

CONTACT REPORT

Person Completing Report: Don Steffeck
Date of Contact: July 15, 1982
Type of Contact: Interview
Person Contacted: Mr. Roscoe Hardwick
Commissioner, Meredosia Lake & Willow Creek
Drainage and Levee District
RFD #1, Box 47
Arenzville, Illinois 62611
Phone: 217/584-1755

Summary of Discussion:

Mr. Hardwick said there were residents within the District who raised and released bobwhite quail. He said there were a number of white-tailed deer present and that there were ducks on the area in the fall although their numbers were much reduced from the 1940's and 1950's. He said that he had cleared all the trees and brush off of ditch number 1 a couple of years ago and that quail hunting, which had formerly been excellent, had dropped off to almost nothing. Mr. Harwick stated that some of the local people have caught grass pickerel with hook and line but bass, bluegill and carp were much more common. He said they used to catch channel catfish in Pankey Pond ditch but hadn't fished it recently.

APPENDIX F

**Resume' of Principal Investigator
Donald W. Steffeck**

Name: Donald W. Steffeck

Current Employer: U.S. Fish and Wildlife Service

Place of Employment: Rock Island Field Office, Rock Island, Illinois

Date Employed: October 1979

Position: Wildlife Biologist

Experience:

<u>Employer</u>	<u>Position</u>	<u>Dates</u>
Illinois Natural History Survey	Aquatic Biologist	6/76 - 10/76
Illinois Natural History Survey	Wildlife Biologist	10/76 - 10/77
U.S. Fish and Wildlife Service	Biological Tech-Wildlife	10/77 - 6/78
Illinois Natural History Survey	Wildlife Biologist	6/78 - 10/79

Publications:

Steffeck, D.W. 1977. A Preliminary Study of the Male Genitalia of the North American Conopidae (Diptera). Unpublished Master's Thesis. Western Illinois University, Macomb, Illinois.

Bellrose, F.C., F.L. Pavaglio, S. Sather, and D.W. Steffeck. 1977. Wildlife Habitat Changes Resulting from the Construction of a Nine-foot Channel in the Illinois Waterway from LaGrange Lock and Dam to Lockport Lock and Dam: Report for the Army Corps of Engineers, Chicago District.

Pavaglio, F.L. and D.W. Steffeck. 1977. Wildlife Research Needs of the Illinois River Basin. Special Report No. 6. Proceedings of the Annual Meeting of the Water Resources Center, University of Illinois at Urbana-Champaign.

Bellrose, F.C., R.E. Sparks, F.L. Pavaglio, D.W. Steffeck, R. Thomas, and R.A. Weaver. 1977. Fish and Wildlife Habitat Changes Resulting from the Construction of a Nine-foot Channel in the Illinois Waterway from LaGrange Lock and Dam to Lockport Lock and Dam. Report for the Army Corps of Engineers, Chicago District.

Steffeck, D.W. and F.L. Pavaglio. 1978. The relationship of Aquatic Plants and Mollusca to the Food Habitats and Population Levels of Diving Ducks on the Keokuk Pool (Pool 19), Mississippi River. Report for Northern Prairie Wildlife Research Center, Jamestown, North Dakota; U.S. Fish and Wildlife Service.

Sparks, R.E., F.C. Bellrose, F.L. Pavaglio, M. Sandusky, D.W. Steffeck, C.M. Thompson. 1979. Fish and Wildlife Habitat Changes Resulting from the Construction of a Nine-foot Channel on pools 24, 25 and 26, Mississippi River and the Lower Illinois River. Prepared for St. Louis District, Corps of Engineers. 217pp.

Bellrose, F.C., F.L. Pavaglio, D. W. Steffeck, 1979. Waterfowl Populations and the Changing Environment of the Illinois River Valley. Illinois Natural History Survey Bulletin Vol. 32, Art. 1, pg. 1-54.

Steffeck, D.W., F.L. Pavaglio, F.C. Bellrose, R.E. Sparks. 1980. Effects of Decreasing Water Depths on the Sedimentation Rates of Bottomland Lakes in the Illinois River Valley. Water Resources Bulletin Vol. 16, No. 3, pg. 553-555.

Havera, S.P., F.C. Bellrose, K. Archer, F.L. Pavaglio, D.W. Steffeck, et. al. 1980. Projected Effects of Increased Diversion of Lake Michigan Water on the Environment of the Illinois River Valley. Prepared for Chicago District, Army Corps of Engineers. 861pp. + appendices.

Jackson, G.A., C.A. Korschgen, P.A. Thiel, J.M. Besser, D.W. Steffeck and M.H. Bockenhauer. 1981. A Long-term Resource Monitoring Plan for the Upper Mississippi River System. Report for Environmental Work Team. Upper Mississippi River Basin Commission Master Plan, Minneapolis, MN. 966 pp. + appendices.

Bellrose, F.C., S.P. Havera, F.L. Pavaglio and D.W. Steffeck. 1982. The Fate of Lakes in the Illinois River Valley. Illinois Natural History Survey Bulletin (with editors).

Education:

M.S. 1977 Zoology Western Illinois University
B.S. 1973 Biology Western Illinois University

Professional Registrations:

The Wildlife Society
National Wildlife Federation

